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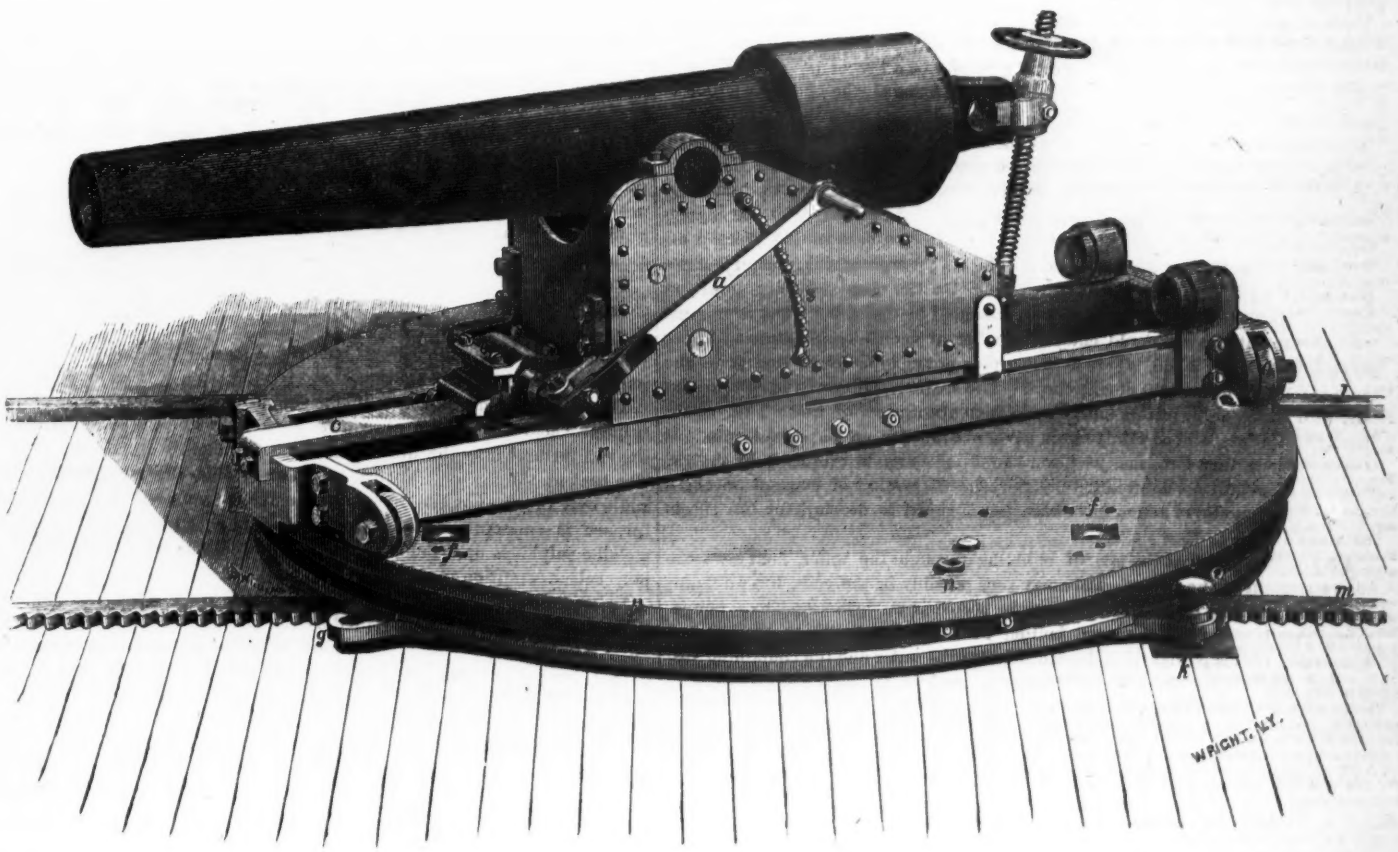
Rotary Gun Carriage.

THE improvement of gun carriages has long been recognized as a work not less important than the improvement of guns themselves. Indeed, since the progress in cannon making has steadily tended to increase the weights handled, the production of carriages capable of dealing with those weights, and with all the other requirements of naval and land gunnery, has become an absolute necessity. A weight of metal which would once have sufficed for the broadside of a frigate is now concentrated in three or four guns, and the consequence is that those must have every possible angle of fire. Naval architecture has been progressing from one improvement to another until gunboats have now been armed with a single battery placed amidships instead of two lines of cannon just under the bulwarks. We illustrate, this week, a rotary carriage, designed by Captain ERICSSON, and which has been used in some Spanish gunboats and also in the United States steamer *Chickamauga*. The *Army and Navy Journal* says of it: "The leading feature of the device is that of placing the gun carriage and its rotary slide on a circular platform, supported on four cylindrical rollers (partially shown at *f f*), provided with flanges like the wheels of railway carriages. These rollers, the axles of which turn in appropriate bearings under the platform, move on two flat parallel bronze rails, *l m*, secured to the deck at right angles to the line of keel. One of these rails, *m*, is provided with cogs on the outside, thus forming a toothed rack. A small horizontal cogwheel under the platform is geared into the said rack and actuated by a set of cogwheels arranged as in ordinary lifting jacks. The gear is put in motion by a vertical spindle having a hand-wheel attached to its upper end, the lower end being made to fit a square socket, *n*, formed in the axle of the actuating pinion of the gear. It is hardly necessary to observe that after having transferred the platform to the desired position, the vertical spindle should be lifted out of its socket and removed, in order not to interfere with the free rotation of the slide. It may be mentioned that in addition to the gear referred to, suitable eyebolts are applied to admit of employing ordinary tackle in transferring the platform from side to side. Having been rolled into position on the fighting side of the vessel—say starboard—the platform must of course be secured by *two* fighting-bolts. One of these is seen at *k*, the second of the pair being concealed by the slide. On rolling the platform to port, after having removed the fighting-bolts, the latter will be inserted through the bolt-holes of the lugs, *g*, on the opposite side of the platform. It should be observed that in housing the gun, the fighting-bolts will occupy diagonal positions, plates as shown at *k* being inserted in the deck accordingly.



ERICSSON'S ROTARY GUN CARRIAGE.

"Artillerists are aware that if the force of the recoil were brought to bear on the central pivot round which the slide revolves, the latter would be lifted up violently or seriously jarred at the instant of discharging the gun, since the vertical line passing through the center of the trunnion is far in advance of the central pivot, when the gun is rolled out. To prevent such lifting or jarring, a very effective expedient has been resorted to by the constructor, viz.: that of attaching a bracket, *d*, at the forward end of the slide, extending about two inches below its base, and bearing firmly against the circumference, *p*, of the platform. It will be readily seen that if the bracket referred to, which acts as a hook, be placed at a proper distance while the pivot round which the slide turns fits loosely in its socket, the force of the recoil will be received wholly by the edge, *p*, of the platform at the point where the bracket, *d*, bears. The professional reader cannot fail to perceive the advantage of transferring the strain from the central pivot

in rear of the trunnion, to a point in *advance* of the same. Obviously, the practical result will be that of causing the carriage and slide to bear down against the platform, instead of being violently jarred or lifted up, as it would be if the force of the recoil were brought to bear on the central pivot. Regarding the proper position of the fighting-bolts for securing the platform during firing, it will be evident that if inserted at *k*, as shown (for the sake of ready explanation) in the engraving, the platform would be lifted or jarred at the moment of discharging the gun; while by inserting the fighting-bolt at *g*, the tendency will be to depress the platform, thereby securing perfect repose throughout the entire structure.

The Warsop Boiler.

AT the present moment, attention is being drawn to a new method of increasing the efficiency of the steam engine by pumping heated air into the boiler. It is impossible to conjecture what theoretical considerations could have led Mr. WARSOP, the discoverer of the system, to anticipate beneficial results from the adoption of such an expedient, and yet the experiments that have been made in proof of its efficacy are so authoritative that they cannot be repudiated on the ground of their being unsupported by theory. This subject, although much debated of late, is still so ambiguous and obscure that I shall take the present opportunity of stating the difficulties of the case in the hope of eliciting satisfactory explanation.

MR. WARSOP'S method consists in attaching to a steam engine a forcing pump, for the purpose of injecting air into the boiler. The pipe from this forcing pump is formed into a coil in the flue, so that the air may absorb a portion of the waste heat. After entering the boiler the pipe is laid along the bottom, and being perforated with holes, allows the air to bubble up through the water at many different points. The result appears to be that, with a given expenditure of fuel, the available power of the engine is considerably increased by the action of the air-pump, notwithstanding that the power for working it is derived from the engine itself. How, then, is this to be explained? It is clear that air forced into a receiver cannot without the aid of extraneous heat give back all the power expended upon the forcing pump. There must of necessity be a loss of power by friction, and also from the impossibility in practice of realizing all the expansive action of the condensed air corresponding to the compressive action of the pump prior to actual injection taking place. It would be a liberal estimate to assume that one-half of the power expended on the pump is recoverable from the air. Hence, to make up the deficiency by the application of heat, we should have to double the volume of the air, which would require it to be heated to upwards of 500 degrees Fahrenheit above its initial temperature. Now, in the case of the Warsop arrangement, considering the inconsiderable heating power of the escaping gases to which the air-pipe is exposed; considering also the slow absorbing power of the air, and the smallness of the surface presented by the coiled pipe, it is hard to believe that the air could enter the boiler at such a temperature as I have named; but even if it did, where is the surplus power to be found that gives the engine a palpable increase of efficiency? The mere reaction of the compressed air, with all the aid it can possibly derive from absorption of waste heat, would barely save a loss, and certainly could never account for an important gain. It seems obvious, therefore, that whatever beneficial action is exercised by the air, must be of an indirect nature, and not the immediate effect of its mechanical energy. Three modes of action have been put forward to account for the effects obtained.

Firstly, it is said that the air, in bubbling through the water, facilitates the disengagement of the steam. This may very possibly be the case, for we know that water, entirely deprived of air, may be heated in an open vessel to a temperature greatly exceeding the usual boiling point, before ebullition commences. The reason of this is that the adhesion between the water and the containing vessel, and also between the particles of water themselves, is sufficient to restrain the formation of steam at the usual boiling heat, unless air be present to afford points of separation. So far the explanation is plausible; for if the abstraction of air from water raises the boiling point, we may infer that the addition of air will lower it. But the reduction of the boiling point, within any supposable limits, would not lessen the quantity of heat required for the production of the steam sufficiently to afford a solution, because the sum of the latent and sensible heat, though not constant, as was formerly supposed, does not vary in relation to the boiling point to such an extent as would account for any important saving in that direction. A tangible advantage might, however, accrue from the accelerated transmission of heat from the fire to the water, caused by the increase of difference which a lowered boiling point would occasion between the temperature of the water and that of the fire and gases acting on the boiler; but in the absence of thermometric experiments to show how much the boiling point is actually reduced, and how much the escaping gases are cooled, it is impossible to form any definite opinion as to the amount of this saving. It is certain, however, that unless the reductions of temperature be greater than can be readily conceded, they will not be sufficient to account for so large an economy as is said to be realized.

Secondly, it is argued that the bubbles of air virtually afford an extension of heating surface. So they do, in relation to the heat carried in by the air; but the air can only part with its heat by lessening its direct contribution to the power of the engine. Moreover, if the heat carried in by the air be insignificant in quantity, as I believe it to be, the explanation fails in every point of view.

Thirdly, it is stated that the action of the air prevents and even removes incrustation, and thereby keeps the heating surfaces free from all obstruction as regards the transmission of heat. Very careful observation would be required to establish this fact; but, granting the fact, it would follow that the advantage of injecting air would be limited to those cases in which deposit would otherwise be formed. In a boiler perfectly free from incrustation the injection of air ought to be nugatory, but this does not appear to be the case.

Fourthly, it has been ingeniously suggested by Mr. SIEMENS, that the air passing with the steam into the cylinder may form a film on the interior surface, capable of arresting, in a great measure, that condensation which is known to be so wasteful of power in unjacketed cylinders, where the steam is used expansively. It is highly probable that the air would really accumulate in this manner against the sides of the cylinder, because, while the particles of steam sank down into water, the particles of air would remain. It is also pretty clear that this film of air would intercept the abstraction of heat by the cooled material of the cylinder, but if we admit this mode of action, then it would seem to follow that it is only in the absence of a steam jacket to the cylinder that the economy of injecting air is realized, and, in fact, that the injection of air is merely a substitute for steam jacketing. Moreover, if such be the action of the air, pumping into the steam should, in this point of view, produce the same effect as pumping into the water. —*Sir William Armstrong.*

Studies in the Metallurgy of Gold.

By WILLIAM MAIN, jun., Columbia, S.C.

(CONCLUDED FROM PAGE 115.)

Chemical agencies may be employed, but we must study their action to learn the prospect of success. Peroxide of iron which has been exposed to a red heat is acted upon with extreme slowness even by concentrated and boiling acid. Any one who attempts to brighten in that way gold made rusty by furnace action will be convinced of this fact. Even if roasted or were subjected to the action of a chemical solution capable of dissolving the rusty coating, this effect would not be produced without dissolving at the same time a large proportion of the whole amount of ore, a result equally undesirable and expensive.

On the other hand, the gold itself may be dissolved by the use of chlorine or one of the haloid elements. This, however, has no bearing on amalgamation with which the present article is mainly concerned.

If the gold is to be left in a state favorable for amalgamation the rusting which it will evidently receive by the action of pyrites alone, must be removed by chemical agencies in the roasting furnace. The only substances whose action in this way can be economically employed are chlorine, hydrochloric acid and sulphuric acid. The two former are produced by the addition of salt to the furnace charges. Sulphuric acid is evolved by the combustion of metallic sulphides, and is in greater or less proportion to sulphurous acid as the supply of air is abundant or deficient. Its action may sometimes be usefully modified.

Salt has a marked effect in brightening gold particles. This has been known to many experimenters who have, however, overlooked the complications which its use involves. I have had an opportunity of studying the effect of salt on a working scale, in treating several hundred tons, and have noted chemical facts of importance not generally known.

The furnace used was a long muffle similar to that used in the manufacture of sulphuric acid and known abroad as Spence's. The ore being advanced from the end furthest from the fire experienced a gradually increasing temperature. The heat at the far end is just sufficient to start the combustion of sulphur, while over the fire-box the roasting is completed at a red heat. This form of furnace is eminently adapted to expel sulphur without causing an action of metallic sulphides upon gold, while it leaves the particles of iron oxide in a most pulverulent condition.

As sulphate of iron is necessarily formed and decomposed, the tarnish on the gold from this cause was prevented by the addition of eight or ten per cent. of salt. The ore was pyritous, containing, on an average, three to four per cent. of copper, twelve to fifteen ozs. of silver per ton, and about three ozs. of gold. It had a sprinkling of blende and galena, gangue mostly quartzose and decomposed feldspathic. The object of the treatment was to secure all three of the principal metals. When the furnace was in proper working condition the ore, as discharged from the hot end over the fire box, contained but traces of metallic sulphides; practically the whole of the copper was soluble; iron salts were completely decomposed and about 80 per cent. of the silver chlorinated. The gold was in a remarkably bright condition.

Previous experiments had shown that after subjecting the leached ore to a short grinding between stone surfaces, amalgamation of gold could be carried to a high percentage, but that the reactions involved in securing the silver by amalgamation interfered so essentially with the saving of gold as to show that where the latter metals is of prime importance silver must be extracted in another way. In connection with the furnace large tanks had been constructed in which leaching was economically and thoroughly conducted. The plan of treatment proposed was, first, leaching with water to extract copper; second, leaching with hyposulphite of soda to extract silver; third, an amalgamation of the gold.

The formation of chloride of gold in the furnace when salt is used in roasting is familiar to metallurgists. The terchloride, soluble in water, and formed at a very low heat, loses chlorine at a somewhat higher heat (about the melting point of tin), and is transformed into the protochloride, insoluble in water, but decomposed by it in a short time into metallic gold and soluble terchloride. Below a red heat, in laboratory experiments, the protochloride is completely resolved into metallic gold.

Chemists are well aware of the tendency of gold chlorides to form double salts

with the chlorides of potassium, sodium and other metals. Some of these compounds are well known, as those used in toning photographic prints, while others have been little studied.

Although, as a general rule, more stable than the corresponding platinum compounds, these gold salts have a deserved reputation for instability when subjected either to lead or chemical action. Chemistry, however, affords many instances in which what is called the *physical* influence of a body, chemically passive but present in large quantities, has a great influence in bringing about, or preventing, certain changes of composition or condition. This influence is more marked as the attracting body is in a more porous or finely divided condition. Volatile substances are retained by porous bodies at a heat above that which they could otherwise sustain. Chemical combinations are in many instances promoted and the corresponding decompositions retarded. Because crystals of a certain salt are decomposed at a particular temperature it is not certain that this salt, when uniformly diffused throughout a great bulk of some porous substance, will be decomposed at the same temperature; on the contrary, it is frequently the case that a heat somewhat, perhaps much, higher will be required. The influence of "catalytic" or contact action, when more completely studied in all its bearings, will lead to important results.

In the case in point, a gold salt was formed by roasting, which was stable at a full red heat, was insoluble in water, but soluble in hyposulphite of soda. Samples of a few ounces were taken from the furnace and heated in an assay muffle to a bright red for over an hour, with occasional stirring, without diminishing the proportion of gold soluble in hyposulphite.

The solution of gold in hyposulphite would be no great harm if it could be recovered with the silver. The gold, however, is not precipitated by either sulphide of sodium or calcium, even when excess of the precipitant is carefully avoided.

The gold salt formed by roasting with common salt is doubtless a double chloride of gold and sodium, though, perhaps, of a different formula, containing less chlorine than that which has been studied in the isolated condition. The entire insolubility in water of this gold compound was proved by repeated and careful assays, both of the ore before and after leaching, and of a residue obtained by evaporating a portion of the leach liquor representing a much larger quantity of ore than could be taken for assay.

A solution of sulphate of iron did not increase the amount of metallic gold, nor did prolonged standing of the wet ore in the leaching tanks appear to produce any decomposition of the insoluble gold salt. It was quickly reduced by contact with iron or quicksilver; a sample taken from a barrel amalgamator, after revolving an hour and a half, showed that no perceptible amount of gold was extracted by solution of hyposulphite, although about forty per cent had been soluble when the pulp was charged. A similar effect was produced by grinding, without quicksilver, in a pan with stone bottom, the sides being lined with sheet iron. A certain amount of grinding had to precede amalgamation, in order to disintegrate the softer particles, but the fine slime thus produced would render an after leaching impracticable if attempted in the ordinary manner.

Particles of calcined ore, which were originally pure pyrites, retain their shape sufficiently to allow of easy leaching, but a moderate amount of friction reduces them to a fine red mud as impervious to water as a layer of fat clay.

An impure sulphate of soda obtained by evaporation from an alkaline lake containing much chloride of sodium, had an effect in roasting but little different from that of pure salt. Sulphate of soda roasted with pyrites in a long muffle is partly converted at the cooler end into bi-sulphate. As the ore is advanced to the hotter end, sulphuric acid in the nascent state, arising from the decomposition of the bi-sulphate, acts at a red heat upon gold particles which may have a film of tarnish and upon oxide of copper. The metal is brightened just as the chemist is accustomed to clean his platinum crucible by fusing in it a little bi-sulphate of potash; oxide of copper is converted into sulphate.

A certain amount of clay is favorable to the roasting process—very much so for the production of clean gold and soluble copper. Sulphate of alumina is formed and afterward decomposed by a red heat, having an effect similar to sulphate of soda.

The effect of a chloridizing roasting is necessarily to convert a portion of the gold into a chemically sub-divided precipitate. The proportion of the gold so acted on varies much with different ores, owing probably to a difference in the natural chemical or mechanical condition of the gold.

A long muffle, when it has once attained a working heat, does not require an amount of labor or consumption of fuel materially different from that of the ordinary form of calciner on the long reverberating pattern. On the other hand, ore can be brought in it to that point at which all metallic sulphides are oxydized, all copper (in a low grade ore) is soluble, while all iron sulphates are decomposed This can be done with regularity and ease, while it is a point impossible to hit and maintain with other furnaces in which flame or hot gases come directly in contact with the ore. The sole of the muffle forms a perfect heat regulator, while its length secures economy of fuel. If this furnace is used for a chloridizing roasting, a complete hydro-metallurgical treatment for pyritous ores containing copper, gold and silver, would be:

First, leaching in water to extract copper; second, chlorination and extraction of gold; third, leaching with hyposulphite to extract silver.

A sulphatizing roasting with sulphate of soda has been proposed for an ore of this description, the object being to extract both copper and silver by the lixiviation with water and amalgamate or chlorinate the gold.

It has not, however, been proved that copper and silver can both be completely sulphatized even in a muffle at the same temperature; metallurgical experience would rather prove the contrary, as in the Ziervogel process sulphate of copper is decomposed before the silver is considered to attain its maximum percentage of solubility.

It is difficult in many places to get water free enough from chlorides to avoid loss of silver from precipitation during the leaching process.

Copper Mining in the Past, and its Prospects in the Future.

There are few monied men in the States who have not lost money in copper-mining; and, therefore, however reluctantly they may hear the subject referred to, it cannot be amiss to look at the reasons of their losses. The fact that copper-mining in the United States has not been generally successful, is traceable to several causes. In the first place, numberless mines have been pawned upon the public, which have with difficulty afforded the specimens on the credit of which they have been sold; others again, which might have flourished under judicious management, have been so unskillfully and extravagantly worked, that, though good, they have yielded but small profit to their owners; and not a few more have been necessarily excluded from prosperity by their inaccessibility. Yet, while it cannot be denied that the copper-mining done by the numberless companies organized under the excitement of each recurring mania, has been discouraging, the result, nevertheless, of legitimate mining, where that has supplanted mere speculation, has been the very reverse. Devon, Cornwall and Wales, with an area exceeding that of the copper region of Lake Superior, do not produce one-half as much; and while, almost without exception, the British mines are working to no profit, the Calumet and Hecla is netting its shareholders millions annually. The narrow peninsula of Keweena, stretching out into Lake Superior, yields about one-eighth of all the copper mined the world over, and much of this is derived from ores containing only from forty to eighty pounds of copper to the ton.

If copper is to be mined profitably it must be found in large quantities. The ore must not necessarily be rich, but there must be plenty of it. As in the distribution of many another mineral, however, so in that of copper, there are to one large deposit hundreds of little ones, none large enough to nourish a mine, but each large enough for the credulous to build false hopes upon, and to tempt to the reckless expenditure of money above and below ground. Almost every State has its list of copper-mines worked and abandoned, but begging to be tried again. Yet, if amidst this multitude throughout the length and breadth of the land, there should be opened up six substantial lodes, this country would reverse her present position, and from being an importer become at once a large exporter. And that such must soon be her attitude is certain, for copper-deposits of great extent do exist within easily accessible limits. It does not require that a country be underlaid with copper to give it prominence in the copper-trade. More than one-half of the copper which enters the markets of the world comes from Chili, and yet, about one-half of this is mined from three lodes, the productive portions of each of which do not exceed two miles in length. There, as here, exist hundreds of insignificant mines, yielding a few tons of ore annually, to every large one yielding its thousands. The difference is that there the little lodes, if not altogether neglected, are worked by a miner or two, content if they make simple wages, while here each such veinlet is made the foundation on which to build a company. There, moreover, mining is a business—here it is a speculation.

But the result of copper-mining on Lake Superior shows that not only there are deposits in the United States rivalling in richness and extent those of Chili itself, but that the same skill which has enabled the long known but neglected mines of South America for twenty years to control the markets of the world, can be applied here with as marked effects.

In the Rocky Mountains and in California there are copper lodes, some of which were worked disastrously in times past, when the high cost of transport made success almost impossible; others of which will be adequately opened up when railroad communication reaches them, and the success of other mines nearer home has removed the sensitive repugnance with which monied men shrink back, without discriminating, from the mere mention of a copper mine. And that such mines there are nearer home does not admit of a doubt.

There was discovered in 1855, in the mountains of Tennessee, the out-crop of an enormous lode. At surface it presented a mass many feet wide, and miles in length, of what miners call *gossan*, an oxyd of iron which results from decomposition of iron pyrites. Beneath this was found a layer of rich black ore of copper, which had been derived in the course of ages, from that portion of the lode now occupied by the *gossan*. To that was found to follow, in mining downwards, a layer of solid iron pyrites or *mundic*, and this happily has passed into a lode of copper-pyrites, large and rich enough to all appearance to make Ducktown a center of mining industry for generations.

On the first flush of the excitement consequent on the discovery of Ducktown, Tennesseeans explored the Blue Ridge through the northwestern part of North Carolina and the southwestern part of Virginia, and found what they believed to be the continuation of the Ducktown lode, extending, with intervals, for a distance of two hundred miles. Openings along the lode were made at spots in Ashe and Alleghany counties, N. C. and in Carroll and Floyd counties, Va.; but nowhere was work so done as to determine the value or the worthlessness of the deposits. One opening seemed peculiarly promising, but how little likelihood there was of those who made it recognizing the value of their own work, may be judged of from the fact that they threw away their best ore as worthless, built

their cabin-chimnies of purple sulphuret, and took the balance to a creek near by, where they managed (it must have been with difficulty) to wash away so much copper and retain so much earthy matter that they reduced an ore, which, as it came from the mine, must have yielded about 30 per cent., to 19 per cent. That a very short attempt at mining by such hands should have wound up the association of farmers who were thus mangling Ore Knob, is not to be wondered at; and that their stupidity should have remained so long unexposed, may be easily accounted for by the war, and the roads of North Carolina.

But this spring, the Messrs. CLAYTON, associated with some gentlemen of Baltimore, determined to confirm or disprove the stories of the richness of Ore Knob. They emptied the old shafts of water and debris, and were rewarded by finding, already exposed, a copper lode almost without parallel for richness. As now seen, at 55 feet from the surface, it is a huge fissure-lode, filled with solid purple and yellow sulphurets of copper, mixed with a very small percentage of foreign matter in the forms of magnetic oxyd of iron and garnet. Its width is from 12 to 15 feet, and the average produce of the ores, just as they have come broken from the mine, is from 25 to 30 per cent. of copper. The Ducktown, and to all appearance most of the other deposits elsewhere throughout the Blue Ridge, are bedded veins. They are formed, it would seem, by the metalliferous deposit composing the lode having filled a fissure which had been formed by the strata of rocks under disturbing force, parting asunder, like the leaves of a book, along the line of their original deposition, and not as is usual in fissure-veins, across the lines of stratification. That the Ore Knob lode is of the latter description will plead in its favor to many minds.

To the owners, however, it is a matter of very little consequence whether it be a bedded lode or a fissure lode, or how the copper ever got there at all. To them the all-important consideration is the fact that at this moment twenty miners are perhaps extracting a greater value of copper from Ore Knob than the same number of men, doing the same description of work, are breaking from any other known mine.

The old workings were unwatered in April, and since then, on an average, ten pair of men have been at work underground. But of this labor about one-quarter has been occupied in timbering the old shafts, and securing in like manner others now being sunk; so that fourteen men may be considered to have been the effective force engaged in mining. These fourteen men, from April 7th to June 23d, that is in sixty-six working days, broke from the lode 1,500 tons of ore, whose average yield does not fall below 25 per cent.; or in other words, over five tons of metallic copper have been daily extracted, in the form of 25 per cent. ore, by fourteen men. And this has been done while prosecuting what is usually looked upon as unprofitable work, for it is seldom that a mine is so rich as to render remunerative the work done in sinking its shafts and driving its galleries, which is merely preparatory to that of extracting the ore.

This preparatory work accomplished, the ore is left hanging between the galleries driven at different levels through the lode, and then a much greater quantity can be broken with the same amount of labor than from the confined floor of a shaft or the end of a gallery. It will be apparent, therefore, that the yield of ore per man, enormous as it is, is not one-half of what each man will break as soon as the mine has been properly opened, and the company has made preparations to treat the ore. Till then, what they are not obliged to remove, will remain more conveniently stored where nature placed it than cumbering the surface.

Such extraordinary results are due, as already stated, to the very unusual occurrence of so heavy a lode of solid sulphurets of copper, almost entirely uncontaminated with rock. Solid beds of sulphuret of iron—*iron pyrites*—are no rareties, for such lodes, carrying 2 to 4 per cent. of copper, exist in many parts of the world, and are the source whence most of the sulphuric acid is manufactured; but a solid lode of the sulphuret of copper of such magnitude is almost a mineralogical curiosity, and is, of course, of almost incalculable value. Some idea of its present apparent value may be derived from the consideration that when sufficiently opened up one hundred miners can be put to work upon it; that these, breaking each two tons of ore, will mine two hundred tons daily, the copper in which will be worth $25,000, and not probably cost $5,000 to extract and deliver to market, leaving for the day's work a net profit of $20,000.

Work on such a scale, and even profit on such a scale, is not quite without precedent in the history of copper-mining. I previously referred to Chili, and would again revert to it for an example. For twenty years past a single lode, that of Tomaya, has yielded at the lowest 9,000 tons of copper, annually. The linear extension of the lode is not much greater than that ascribed to Ore Knob. (which has been traced by a bold outcrop for over 1½ miles,) and on an average it has not exceeded the Ore Knob in width, that is from 12 to 15 ft. The day was when Tomaya yielded very rich ores, and one of its mines, the Piki, shipped a 60 per cent. purple ore by the cargo. Then the average of its yield stood higher than that of Ore Knob, not because it contained a more massive and unmixed body of ore, but because the grade of the ore stood higher. But long since its ores have sunk to an average yield of 8 per cent. Yet, out of this 8 per cent. ore, by the application of machinery, and the employment of many hands, ore enough to yield 25 tons daily of pure copper is mined, raised and dressed.

There seems no reason why, with its more favorable situation, and under the impulse of American enterprise, a lode like Ore Knob, which can be compared only with such exceptionally rich deposits as Tomaya, should not soon do as well as Tomaya did in her palmiest days. Every obstacle lay in the way of the Chilian lode—every advantage is in favor of Ore Knob. The one lode forms the crest of a high mountain, too steep to be climbed directly by any animal but a goat, the other lies in one of the most lovely portions of the Blue Ridge, in the midst of a farming country capable of supplying the necessaries of life cheaply to a large population. At Tomaya, every drop of water and every pound of fuel has to be dragged thousands of feet up its abrupt sides, for it is a barren rock on which rain rarely falls. At Ore Knob, fuel in abundance abounds for all mining and smelting purposes in quantities to last, if used with judgment and economy, beyond the requirements of the present generation; and even a comparison of the cost of labor results in favor of the North Carolinian mine.

I have adduced this instance merely to show that the success of mining, where mining is pursued as a business, is not due altogether to exceptionally favorable local or social conditions, and to show that there are, in the United States, mines richer and more advantageously circumstanced than in the paradise of copper mines—Chili. From my own experience, gathered during a recent visit to some of the mining districts of that Republic, I can confidently state that at present there is not there a single mine producing such rich ores in such abundance as Ore Knob; and, moreover, that few of the famous mines there, which still, though at a depth of from 200 to 300 fathoms, are yielding remunerative returns from ores of from six to eight per cent., were at surface richer than Ore Knob now is. Work has been well commenced there by MR. JAMES E. CLAYTON, of Baltimore, to whom is due the credit of having unearthed this valuable mine; and it will not be his fault if it is not speedily carried to a brilliant issue.—*James Douglas Jr., in Boston Advertiser.*

Phosphor-Bronze.

THIS alloy continues to attract much attention on the Continent, and especially in its application in rolling-mills and tuyeres for blast-furnaces. The inventors, MM. MONTIFIORE-LEIB, and Dr. KUNSEL, have sent to the Vienna Exhibition a collection of models illustrative of its application in artillery, arms, and other objects. M. GILLIEAUX, of Charleroi, and M. BLONDIAUX, of the Thy-le-Château Society, have, from the first production of the alloy, employed it in the construction of rolling mills, and the following are the results of three years' experience: This bronze has been employed for the great bearings of plate and general rolling-mills, and for conical gearing in universal rolling-mills. The motive power of the steam engine that drives the rolling-mills in which it is used, is of 170 horse-power to 200 horse-power, and the speed of the rollers about sixty revolutions per minute; the engine drives a sheet-iron mill, a universal mill, and a rough-shaping mill, and is not at a standstill for more than one hour and a half in the twenty-four. The rollers are 1·90 millimeters long, and 0·62 millimeters in diameter, and weigh five tons. It was found that the gear, when made of hard cast iron, broke frequently; these were first replaced by wheels of ordinary bronze, and finally by phosphor-bronze. The duration of ordinary bronze wheels did not exceed, on an average, five months, while those made of phosphor-bronze wear for about nine months. The latter alloy is found equally superior to the former when applied to bearings.

M. BRONDIAUX has applied phosphor-bronze not only in the making of pinions but in the driving axles of mills, with great advantage; in the latter case the superiority seeming to depend not in the hardness but in the very great resistance of the alloy, the arbors in phosphor-bronze twisting much less than those made of forged iron, and not being liable to break like those of cast iron.

Engineering and Mechanical Notes.

Architects who have charge of buildings, the corner stones of which are to contain commemorative articles, are warned that unless measures are taken to prevent the entrance of moisture, future generations are likely to find little that is legible among the documents. Proof of this was lately obtained by opening the corner-stone of Grace Episcopal Church, in Albany. It was laid on the 8th of July, 1850, and on being opened its contents were found in a very decayed condition, on account of being placed in the stone without the proper protection of a box or wrapper. The contents of the stone consisted of copies of the *Argus* and *State Register*, of Monday, July 8, 1850, New York *Churchman* and *Gospel Messenger*, of July 6, 1850, and the Bible and Common Prayer-book. All of the articles, even the Bible and prayer-book, were partially defaced and rotten, the books being very damp.

Foreign papers report that considerable use is now made of gas as a means of lighting mines. A patent apparatus has been fixed at many collieries in South and West Yorkshire, as well as in the North of England coal-fields. Some excellent testimonials have been received as to the efficient way in which it is performing its work. The jet can be applied to almost any depth, it being now in use 500 yards below the surface of the ground. A steam jet is used to draw gas into and force it down a pipe to the bottom of the mine.

A Howard boiler without a seam or rivet has lately been built in Edinburgh. It is constructed of lap-welded iron tubes of large diameter, and fixed in such a way that every part of the boiler internally is made easy of access for cleaning or repairs. From its construction it is believed that it insures almost entire immunity from dangerous explosions, and its strength is so great that it is able to carry a very much higher pressure than is customary in land boilers.

The Lackawanna Iron and Coal Company, Scranton, Pa., have erected a new cupola furnace which is sixty-seven feet high, and at the boshes twenty-three feet diameter. The capacity of the furnace will exceed 300 tons per week, and its cost will reach $200,000. Being a large furnace, it is of course heralded as the largest in the world, but this is not true. The highest furnace is 102 feet high, and the widest has boshes of 30 or 33 feet diameter.

THE COAL TRADE.

NEW YORK, August 21, 1873.

Business in anthracite continues good, and the usual ten cents has been added to prices this week. The lists now stand as follows:

Pennsylvania Coal Company.

Lump	$4 90 per ton.
Steamer	4 90 "
Grate	5 00 "
Egg	5 10 "
Stove	5 40 "
Chestnut	4 90 "

Lehigh Coal Exchange.

Lump	$5 75
Broken	5 60
Egg	5 40
Stove	5 75
Chestnut	5 05

Wilkesbarre.

Lump	$4 95
Steamer	5 05
Broken	5 15
Egg	5 30
Stove	5 50
Chestnut	4 95

G. B. Linderman & Co's. Sugar Loaf.

Lump	$5 90
Broken	5 75
Egg	5 75
Stove	5 85
Chestnut	5 10
Pea	4 00

Lehigh Coal and Navigation Co.

	Old Co's Lehigh	Boomitun	Plymouth	Newport
Lump	$5 90	$5 75	$	$
Broken	5 75	5 60	5 25	5 25
Egg	5 75	5 60	5 50	5 40
Stove	5 85	5 75	5 70	5 60
Chestnut	5 10	5 05	5 00	5 00

Delaware and Hudson.

Furnace Lump	$4 95
Steamer Lump	5 05
Grate	5 15
Egg	5 30
Stove	5 50
Chestnut	4 95

Philadelphia and Reading Company.

	Lump	Steamer	Broken	Egg	Stove	Chestn
Hard White Ash Coal	$4.50	4.50	4 60	4.60	4.80	3.85
Free Burning White Ash Coal	$4 50	4.50	4 60	4 60	4 80	2 85
Schuylkill Red Ash Coal			4 60	4 75	4 95	3.85
Alaska Red Ash "			4 60	4 60	4 80	3.85
Shamokin White Ash "			4 70	4 90	5 00	4.10
Shamokin Red Ash "			4 70	4.90	5 00	4.10
North Franklin "			5 00	5.00	4 90	3.90
Lorberry "			5.25	5 25	5 25	4 25
Lykens Valley "				6.05	6.05	4 70

The sale of 90,000 tons at auction, is announced for next Wednesday, and there is some curiosity to know whether there will be as much eagerness to bid as there was last month.

The Philadelphia and Reading Railroad Company announce, that on and after September 1, 1873, and until further notice, a drawback of five cents per ton will be paid on all anthracite coal shipped from Port Richmond. Also, that on and after September 1st. a drawback of twenty cents per ton will be paid on shipments of Anthracite coal from Schuylkill Haven and Port Clinton that have passed Fairmount Locks to Philadelphia and vicinity.

The bituminous trade continues perfectly flat. No coal is coming in yet, on account of the damage to the Chesapeake and Ohio Canal, which will not be repaired for a few days yet. Dealers appear to look upon this block with pleasure, for there is nothing to do with cargoes if they came forward. Foreign coals are in precisely the same predicament, receipts very light and hardly any demand. Liverpool House Cannel is quoted at $22, Liverpool Gas $16@$18, Newcastle $12,50, Scotch $14@15, and Steam $9.

Bituminous Coal Trade, 1873 and 1873.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending August 9, 1873, compared with week ending August 10, 1872.

COMPANIES.	1872. Week.	1872. Year.	1873. Week.	1873. Year.
C. & O. Canal	18,941	388,454	1,163	373,898
B. & O. R. R.	25,449	781,973	31,417	840,392
Penn. S. Line	....	.....	1,472	50 651
H. & B. T. R. R.	6,239	186,364	6,654	276,294
*Harrisburg & D.	9,305	305,154	5,004	217,182
*L. V. R. R.	494	19.499	51	19,582
P. & N.Y.C & R. Co.	7,198	242 412	6,160	205,046
Cumberl'd Branch Canal.	5,260	129.942	544	73,104
" Railroad	85	11,599	1,116	58,602
Total	73,971	2,065,381	53,582	2,165,011
	53,582			2,065 381
Decrease	20 389			99,630
Increase	....			

Anthracite Coal Trade for 1873 and 1873.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending, 1873, August 16, compared with the week ending August 17 1872.

COMPANIES.	1872. WEEK.	1872. TOTAL.	1873. WEEK.	1873. TOTAL.
Phila & Reading R.Rd.	86,768	2,924,944	107,003	3,249,877
Schuylkill Canal	16,422	436,596	21,148	423,737
Lehigh Valley R. R.	51,547	2,180,136	68.60	2,201 963
Lehigh & Sus. R. R.	36,042	1,047,305	50,518	1,220,786
" " Canal	22 947	431 662	8.629	384 690
Scranton North	16.398	4'9 370	27.405	842,711
" South	41,472	1,3'8,3 2	30,395	1,311,777
Penn. Coal Co., rail	26,467	733,200	28,191	752 '51
" " " canal	12)	3,336	1 0	4 694
Del. & Hud C.Co. Canal	44,472	820,240	37,332	820 976
" " East	8,513	258 161	10 164	247,914
" " West	8 967	231,'64	14 3:8	316,977
" " South	8,2'9	231,247	1,423	133 349
Shamokin	12,430	337,991	14,0'9	377,833
Trevorton	....	....	....	....
Lykens Valley Coal Co.	....	....	....	....
Wyoming North	....	....	....	....
Wyoming South	....	....	....	....
P. N. Y. C. & R. R. Co.	12,903	409,924	19,335	470,699
Williamstown Col'y	....	.....	....	....
Big Lick Col	....	.....	....	....
Total	386,789	11,976,081	479,783	12,49'.176
1872	.....	.....	395.89	11,976,081
Increase			43,994	514,095
Decrease				

These figures are for the week and fiscal period commencing Nov. 30.

† Less coal transported for Company's use and Bituminous coal.

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, August 16, 1873.

BY RAILROAD—ANTHRACITE.

PASSING OVER MAIN LINE AND LEB. VAL. BRANCH.

	Tons. Cwt.
From St. Clair	26 526 06
" Port Carbon	2.822 14
" Pottsville	1,818 06
" Schuylkill Haven	27,4'9 06
" Pine Grove	6,'80 19
" Tamaqua	10,302 03
" Harrisburg	2' 00
" Dauphin	7,970 18
Total	83,051 12

FOR SHIPMENT BY CANAL.

Passing Frackville Scales	5,880 05
" Mill Creek "	734 07
" Schuylkill Valley Scales	26' 08
" Mt. Carbon "	6 3 07
" Cressona "	8,403 04
" Pine Grove "	54' 00
" Tamaqua "	1,659 12
Total	18,165 03

SHIPPED WESTWARD VIA CATAWISSA AND WILLIAMSPORT BRANCH AND NORTHERN CENTRAL RAILROAD.

Via Catawissa & Williamsport Br.	338 11
" N. C. R. R. passing Locust Gap	2,3'6 17
" " " Shamokin	4,927 04
" " " Herndon	....
Total	7.622 12

SHIPPED WEST OR SOUTH FROM PINE GROVE.

Via Schuylkill & Susquehanna R. R.	1,'81 08
" Lebanon & Pine Grove Branch	874 1:
Total	2,556 00

CONSUMED ON LATERALS.

From Frackville Scales	434 02
" Mill Creek "	211 16
" Schuylkill Valley Scales	577 05
" Mt. Carbon "	897 13
" Cressona "	224 11
" Pine Grove "	89 00
" Tamaqua "	3.6 05
Total	2,712 19

LEHIGH AND WYOMING COAL.

Received via Silverbrook Junction, Sent East	9,676 15
" Cat. & Wpt. Br. Sent West	....
" " Rupert, Cat. & Wpt. Br.	....
" " Allentown, E. Penn's Br.	67 14
" " Alburtis, " "	85 00
" " Oreland, G. & N. Br.	965 06
" " Willow Street R. R.	305 00
Total	11,099 15

BITUMINOUS.

From Harrisburg	4,883 17
" Connecting R. R., G. & N. Br.	120 00
" Junction R. R.	....
Total	5,003 17

COAL FOR COMPANY'S USE.

Anthracite	5,811 17
Bituminous	281 18
Total	6,093 15

RECAPITULATION.

	Total for Week.	Corresp'g week last year.	Increase and Decrease.
Passing over Main Line and Leh. Val. Branch	81,051 12	79 026 01	i 4 025 08
For Shipment by Canal	18,165 03	15,' 51 04	i 2,813 19
Shipped Westward via Northern Central R. R.	7,622 12	4,453 12	i 3,169 00
Shipped West or South from Pine Grove	2,556 00	1,3'1 18	i 1,2'1 022
Consumed on Laterals	2 712 19	2,950 01	d 237 07
Lehigh and Wyoming Coal	11,'59 15	1,0 2 08	i 10,0.7 07
Total Anthracite paying freig't	125,168 01	104 038 07	i 21,129 14
Bituminous	5,003 17	9,3 5 07	d 4,301 10
Total of all kinds paying freig't	130.171 18	113,343 14	i 16,828 04
Coal for Company's use	6 0.5 15	4,819 08	i 1,'74 07
Total Tonnage for Week	136,'53 13	118,'63 02	i 18 '02 11
Previously this year	4051433 16	3'9 9.8 03	i 15s 285 10
Total to date	4187669 09	4011311 08	i 176,388 01

SHIPPED BY CANAL.

From Schuylkill Haven	18,644 15	16,389 '8	i 2,'55 15
" Port Clinton	2,503 00	599 03	i 1,'04 00
Total Tonnage per Week	21,147 15	16,988 00	i 4,159 15
Previously this year	402,089 00	455,667 05	d 53,57s 05
Total to date	423,236 15	5.2,655 05	d 79,418 10

Report of Coal Transported over the Lehigh Canal

For the week ending August 15, 1873.

REGIONS SHIPPED FROM	TIDE. tons. cwt.	LOCAL tons. cwt.	TL WEEK tons cwt	TL. DATE tons. cwt.
Mauch Chunk Region	1,'87 15	2,'83 07	4,071 02	123,73' 01
Mauch Chunk Region Hazardville	95 12	91 03	186 15	10,194 15
Beaver Meadow Region	195 10	1,'99 06	1,'75 16	66 216 01
Mahanoy Region		477 11	477 11	12,2'6 17
Hazleton Region	100 10	100 12	201 02	113,3'0 12
Upper Lehigh Region	90 00	496 00	595 00	15,'98 02
Wyoming Region	387 00	1,'34 19	1,'21 19	52,191 11
Wyoming Region, Hazardville				738 03
Total	1 968 07	6,'13 18	8.'9 05	384,6.0 02
Previously reported	135176 1b	24.'84 '2	3'6,0'1 17	
Total to date	137142 02	247584 00	3'4,690 03	
Corresponding week last year	166496 16	267163 05	433 662 01	
Increase				
Decrease	29,354 14	19,617 05	48,971 19	

DISTRIBUTION.	WEEK 1873.	WEEK 1872.	YEAR. 1873.	YEAR. 1872.
Consumed on line of Lehigh Canal	1,746 08	1,925 09	41,'99 16	42,'33 16
Passed into Morris Canal to Tidal Points		342 08	1,'87 10	3,323 18
Passed into Morris Canal to Local Points	677 11	1,016 07	16,342 11	13,175 02
Passed into Del. & Rar. Canal to Tidal Points	1,965 07	8,'93 16	135,'92 12	163,'72 18
Passed into Del & Rar. Canal to Local Points		385 13	6,452 03	9,110 10
Consumed on line Delaware Div Canal	1,287 13	1 307 16	2','80 14	27,926 04
Passed through to Bristol	2 952 08	8,8'3 01	16',102 17	174,7'9 10
	8,629 05	22,943 16	384,690 02	433,662 01

Report of Coal Transported over Central R.R. of N. J. (Lehigh and Susq. Div.)

Week ending August 16—Compared with same time last year

REGION SHIPPED FROM.	TIDE. tons ct.	LOCAL. tons ct.	CANAL. tons ct	TL WEEK tons cwt.	TL. DATE tons cwt.
Wyoming	27216 01	4972 15	1617 00	3 8'5 16	1096244 14
Upper Lehigh		3339 04	614 09	3983 13	12 9'1 00
Beaver Meadow	5714 00	2608 00	13.0 05	9'3 2 05	175812 05
Hazleton		127 15	201 02	328 17	1 4'1 10
Mauch Chunk	6342 01	3341 19	4068 01	13752 04	33 829 00
Total	39273 03	14589 12	7841 17	61702 15	1342853 09
Previ'y reported	45305 00	606797 15	328763 01	178 865 14	
Total to date	84667 05	621387 06	3'64 3 18	1842'8 09	
Same time .1872	740857 17	521367 08	2794 8 01	1040983 06	
Increase	144809 08	100019 18	57165 17	301793 03	
Decrease					

DISTRIBUTION.	WEEK 1873.	WEEK 1872.	YEAR 1873	YEAR 1872.
Forwarded East by Rail to Tidal points	39272 05	23471 12	894667 05	740 87 17
Forwarded East by Rail to Local points	9617 18	10892 11	272337 08	253273 00
Forwarded East by Rail use Central Division	1533 03	1553 18	36 88 04	46529 00
Forwarded East by Rail use L. & S.	174 09	214 07	7495 16	5448 04
Delivered at and above Mauch Chunk	1285 01	719 15	48 83 18	33548 11
Delivered at Coalport & Hazard for Canal	7810 17	17564 13	37.691 01	312187 14
Delivered to L. V. R. R. at Packerton	438 11	423 00	16023 07	9304 03
Delivered to L. V. R. Rd at Sugar Notch	1428 17		62839 10	
Delivered to L. & B. R. R.at Plymouth Bridge	211 17	5681 16	124'82 00	138022 08
Total	61702 15	60471 12	1842854 09	1842 853 08

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending August 16, 1873, with Totals to date, compared with same time last year.

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Wyoming	58,'67 14	8.0,1'3 17
" Hazleton	47 86, 05	1,158,1'5 00
" Upper Lehigh		4,'99 00
" Beaver Meadow	12 68 16	443,674 01
" Mahanoy	7,713 08	3.',131 10
" Mauch Chunk	105 11	2'45 06
Total	97,'78 02	2 829 9'3 12
Same time last year	71 4.7 17	2,.05,148 10
Increase	27,.60 05	1.4,.55 02
Decrease		
Forwarded East from Mauch Chunk by rail	89,05' 13	2,2 4,9'1 08
Same time last year	81,547 15	2,1'0, 3.0 1
Increase		84,8.2 05
Decrease	16,502 10	

DISTRIBUTED AS FOLLOWS.

Local East of Mauch Chunk	1,892 04	52,'79 19
Forwarded East for use L. V. R.	699 03	56,982 02
Delivered to Furnaces and Manufacturing Companies	12,771 03	48',9'9 16
Delivered to Cat. & Fog. R. R.	264 14	4 3'8 14
" " East Penn R. R.	78 13	6 5.8 01
" " North Pennsylvania Railroad	6,849 03	220,975 13
" " Port Del	5,776 00	120,560 19
" " East Amboy Railroad	3,870 06	107,'27 08
" " Morris and Essex Railroad	25,341 04	697,8'0 15
" " Bel. Del. Railroad	3,'52 15	89,'95 01
" " Central Railroad	10,762 15	389,495 01
Delivered at and above Mauch Chunk for use of L. V. R.R.	743 04	47,226 12
To P. & N. Y. R. R.	13,3 4 10	314,0'9 07
To Northern Central R. R.	425 13	11,5'9 06
To D. H. & W. R. R.	806 0'	23 721 17
To L. & S. R. R. at Packerton for rail	1e0 15	9,'19 03
To Individuals at Mauch Chunk	21 14	1 84 07
To Individuals above Mauch Chunk	105 09	9 904 01
To L. & S. R. R., at Penn Hav., for railroad		1 541 10
Do. for canal	201 03	103 3'9 12
To Lehigh Canal Mauch Chunk	955 07	41,2'4 17
To Catawissa Railroad		50 00
To L. & B. R. R. at Lock. June	9,176 04	19,118 02
Total	3,9778 02	2,829,903 1

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, August 16, 1873.

	WEEK.	SEASON.
By Delaware and Hudson Canal	37,332	820,676
By Railroad, East	10,164	247,918
" West	14,366	316,977
" South	1,428	133,349
Total 1873	63,290	1,518,920
Corresponding time in 1872:		
By Delaware and Hudson Canal	44,452	820,249
By Railroad, East	8,573	368,161
" West	8,967	239,568
" South	8,299	281,267
Total	70,251	1,649,245
Decrease	130,325	

Delaware Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna, & Western Railroad for the week ending Saturday, August 16, 1873.

	WEEK. Tons. Cwt.	YEAR. Tons. Cwt.
Shipped North	27,405 02	542,711 09
Shipped South	30 395 00	1,341,777 00
	57,800 02	
Total		1,884,488 09
For the Corresponding time last Year:		
Shipped North	6,338 09	439,370 03
Shipped South	41,471 16	1,348,351 11
Total	57,870 05	1,787,721 14
Increase		96,766 15
Decrease	70 08	

Penn. and N. Y. R. R.—Coxton, Pa.

Coal tonnage for week ending August 16, 1873.

	Week. Tons. Cwt.	Total. Tons. Cwt.
Anthracite received:		
From Lehigh Valley R. R.	13,214 10	314,640 07
" Lack. & B. R. R.	2 764 16	22,-97 01
" Pleasant Valley R. R.	3,042 04	109 959 04
" Sul. & Erie R. R.	773 09	23,802 18
Total	19,934 19	470,699 11
Same time last year	12,949 17	396,973 15
Increase	6,985 02	60,775 19
Decrease		
Distributed:		
To Lehigh Valley R. R.		23,568 01
To Lack. & B. R. R.	55 14	1,049 19
To S. Central R. R.	4,055 00	101,939 01
To Ithaca & A. R. R.	5,270 01	93,3-7 05
To Erie R. W. Pockets for shipm't.	5,543 07	170,463 14
To Erie R ilway, Wat ins direct.	887 03	5,800 16
To individuals on line of road	383 10	19,046 04
To points at & above Coxton for use of Co	344 14	18,586 13
To points between Waverley and Elmira	355 10	36 887 18
Total	19,934 19	470,699 11
Bituminous received from BARCLAY R. R.		
Shipped north from Towanda	6,128 07	203,442 15
Shipped south from Towanda	31 08	1,60- 14
Northern Central R. R.		103 04
Total	6,159 15	205,046 13
Same time last year	4,697 12	242,411 12
Increase	1,437 17	
Decrease		37,364 19
Distributed:		
To Erie Railway	6,072 18	183,404 17
To So. Central R. R	18 03	19,640 15
To Ithaca Valley R. R.	55 09	351 06
Lehigh Valley, R. R.	19 08	724 03
To individuals on line of Railroad	12 00	86 7 08
To points on line of road for use of Company		118 04
Total	6,159 15	205,046 13
Grand totals transported		
Anthracite	19,934 19	470,699 11
Bituminous	6,159 15	205,046 13
Total	26,094 14	675,746 04
Same time last year	20,647 09	652,385 04
Increase	5,547 05	23,411 00
Decrease		

Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the week ending Saturday August 16, and during the year 1873, compared with the corresponding period of 1872.

WEEK.

	C. & O. C'l Tons. Cwt	B. & O. R. R. Tons. Cwt.	Pa. S. Line Tons. Cwt	Total. Tons. Cwt.
1873	1,763 16	31,417 06	1,472 05	34,052 19
1872	18,941 07	25,448 15	....	44,390 02
Increase				
Decrease	17,178 01	5,968 12	1,472 06	10, 37 03

YEAR.

1873	873,8 7 15	89 ,3 2 03	57,850 17	1,314 910 15
1872	38-,63 14	78 ,073 1	....	1,170,426 .9
Increase		128,419 02	57,850 17	141,513 16
Decrease	14,553 03	....	....	....

Cumberland Branch R. R.

WEEK.

	To C. & O. Canal. Tons. Cwt.	To F. & O. R. R. Co Tons. Cwt.	Total. Tons. Cwt.
1873	544 01	1,355 15	1,899 16
1872	5,830 17	85 02	5,945 19
Increase		1,270 13	
Decrease	5,316 16	....	4,246 03

YEAR.

1873	73,104 09	58,562 00	131,66- 09
1872	129,924 03	11 8-9 16	141,5-1 9
Increase		47,282 13,	
Decrease	56,817 14		9,855 16

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending August 16, 1873.

	1873. WEEK.	1873. YEAR.	1872. WEEK.	1872. YEAR.
By Railway	28,590 14	752,953 16	26,467 06	733,200 03
" Canal	120 18	4,696 09	120 02	3,355 11
	28,711 12	757,650 05	26,587 08	736,555 14
Increase, 1873	21,091 11			

Northern Central Railway, Shamokin Division.

Below is the return of Coal sent over the Shamokin Division of the N. C. R. W., for the 7 days ending August 16, 1873.

	Tons. Cwt.	
East		
West	14,699 00	
		14,699 00
Same time last year		12,430 04
Increase		
Decrease		2,768 16
Total amount shipped to date		377,862 11
Same time last year		337,991 00
Increase		39,871 11
Decrease		

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, August 16, 1873.

	WEEK.	SEASON.
North	52,254 03	1,641,362 06
South	1,428 06	133,348 15
Total 1873	53,682 09	1,774,711 01
Corresponding time in 1872:		
North	46,521 18	1,603,441 11
South	8,298 19	231,266 14
Total. 1872	55,820 17	1,8-4,708 05
Increase North	3,732 05	37,920 15
Decrease No th		
Increase South		
Decrease South	6,870 18	97,917 19
Increase		
Decrease	3,138 08	59,997 04

Prices of Coal by the Cargo.

(CORRECTED WEEKLY.)

	AT NEW YORK. R. A.	AT NEW YORK. W. A.	AT PHILADELPHIA. R. A.	AT PHILADELPHIA. W. A.
SCHUYLKILL.				
Lump	$- —	$ —	- —	4 50
Steamer	- —	—	- —	4 50
Broken	—	—	4 70	4 60
Egg	—	—	4 75	4 00
Stove	—	—	4 95	4 80
Chestnut	—	—	3 85	3 85
Pea	- —	- —	- —	- —
LEHIGH.				
Freight to New York 50 cents.				
Lump, (on board)	- —	- —	- —	- —
Broken	- —	- —	- —	- —
Egg	- —	- —	- —	- —
Stove	- —	- —	- —	- —
Chestnut	- —	- —	- —	- —
Pea	- —	- —	- —	- —
SPECIAL COALS.*				
Honey Brook, Le'h W. A.	5 80@5 05		- —	- —
Spring Mountain " "	5 80@5 10		- —	- —
Sugar Loaf " "	4 00@5 90		- —	- —
Room Run " "	5 00@5 75		- —	- —
Hill & Harris " "	- —		- —	- —
Shamokin " "	4 10@4 70		- —	- —
Lykens Valley " "	4 70@6 05		- —	- —
Broad T " "	- —		- —	- —

Company Coals.

August, 1873.

	L.	Stc.	Ora.	Eg.	Sto.	Chest
*Scranton at E. Port	- —	- —	- —	- —	- —	- —
Pittston at Newburgh	4 90	4 10	5 10	5 10	5 40	4 90
*Lackawana at Rondout	5 15	5 25	5 35	5 40	5 70	5 10
Wilk'b're at Pt. John'n	4 95	5 05	5 15	5 30	5 50	4 95
Old Co. Lehigh at Pt. John'n	5 90	5 75	5 75	5 85	5 10	—
New York Coal Exchange	5 90	5 75	5 75	5 85	5 10	—

For freights to different points see "Freights"
*To contractors only.

Prices at Baltimore—August, 1873.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 50@4 95
Pittston and Plymouth, do	4 90@5 40
Shamokin Red or White Ash, do	5 85@4 95
*Lykens Valley Red Ash, do	4 70@5 05
By retail, all kinds per ton of 2,240 lbs	7 00@8 00
*George's Creek and Cumberland f. o. b. at Locust Point for cargoes	4 85@5 00
West Va. and Youghigheny gas f. o. b. at L. Point	6 50
Kanawha Cannel, coarse	@12 00

*Freight to New York $2 15.

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein, f. o. b. at Phila	$
Lemon " " "	
Cumberland Vein Coal	
Tyrconnel f. o. b.	$7 00

Prices at Georgetown, D.C., and Alexandria, Va.

August 1873.

George's Creek and Cumberland f. o. b. for shipping $4 65@4 75

Prices at Havre de Grace, Md.

August, 1873

Wilkesbarre and other White Ash for Cargoes	$5 00@5 25
Lykens Valley	5 25@5 50
Shamokin Red or White Ash	5 75@6 00

Bituminous Coals (Cumberland).

Georgetown, F. o. b.	$4 60
Baltimore "	5 10
New York "	7 45
South Amboy	7 50

Prices of Foreign Coals.

August, 1873.

Duty 75 c. per ton.

Corrected weekly by ALFRED PARMELE, No. 32 Pine street, N. Y.

Liverpool Gas (Lump)	— —@— —
" Cannel	17 00@— —
" House "	20 00@22 00
" Orrel	20 00@— —
Per ton 2,240 lbs. ex-ship.	
PRICES FROM YARD.	
Liverpool House Orrel, screened	$21 00@22 00
"Cannel, "	24 00@25 00
Per ton 2,000 lbs. delivered.	

Prices of Gas Coals.

August, 1873.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N. Y

	Coarse	Slack
Block House, f. o. b. at Cow Bay	$2 50	$1 25
Gowrie	2 00	0 00

Corrected by Bird, Perkins & Job, 27 South street.

	Coarse.	Culm of Coal.
Pictou	$3 00	1 50
Sydney	3 25	1 00
Langan	2 75	1 00
Caledonia	2 75	1 25

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty on all slack coal or Culm: 40c. per ton of 28 bushels, 80 pounds to the bushel. On all bituminous coal or shale: 75 cents per ton of 28 bushels.

AMERICAN.	Nominal quo Currency.
Westmoreland f. o. b.	$6 00 @7 00
Fairmount Gas Coal Co. of N. Y. "	6 50 @7 00
Despard Coal Co "	6 50 @7 00
Penn "	6 50 @7 00
Newburg Orrel Gas "	6 50 @7 00
West Fairmount Gas Coal "	6 50 @7 00
Redbank Cannel, at Pa "	12 00 @60 00
AT PHILADELPHIA.	
Westmoreland "	7 50 @0 00

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven Lump and St., net, $1 60; Br., Egg and Ch., $1 65; Stove, $1 75
Shipping at Pt. R., 20c., for use at Phil., $2 18 from Pt. Carbon.

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Phillipsburgh	$0 72
C. R. R., N. J., Phillipsburgh to Elizabethport	65
Shipping expenses at Elizabethport	25
Wharfage	10
Total	$2 23

MAUCH CHUNK TO PORT JOHNSTON.

L. V. R. R., or L. & S. R. R. from M. C. to Phillipsb'g	$0 72
C. R. R., of N. J., Phillipsburgh to Pt. Johnson	1 06
Shipping expenses	25
Wharfage	10
Total	$2 23

TO HOBOKEN

L. V. R. R., Mauch Chunk to Phillipsburgh	72
Morris & Essex R. R. Phillipsburgh to Hoboken	6
Shipping expenses	25
Wharfage	00
Total	$2 23

TO SOUTH AMBOY.

L. V. R. R.	
B. & D. R. R.	1 1
Cam. & Am. R. R.	
Shipping Expenses	35
Total	$2 28

PENN HAVEN TO ELIZABETHPORT.

L. V. R R. Penn Haven to Phillipsburgh	84
C. RR. of N. J. Phillipsburgh to Elizabethport	1 06
Shipping expenses	15
Wharfage	20
Total	$2 25

Freights.—August, 1873

TO EASTERN PORTS.	Cumberland. From Georgetown.	Cumberland. From Baltimore	Anthracite. From Philad'a.	Anthracite. From Baltimore, Port Johnston, Weehawken, and Hoboken.	Anthracite. From Newburgh.	Anthracite. From Rondout.
Amesbury						
Bangor				1 80		
Bath		2 75		1 90		
Boston		2 75		1 80*	2 25	2 05
Bridgeport		2 30		1 60		1 25
Bristol				1 75		1 45
Cohasset Narrows						
Derby				1 25†		
Dighton						
East Cambridge				1 85	2 25	
Fall River		2 40		1 25	1 60	1 45
Hackensack						
Hartford		3 00		1 80		1 70
Hoboken				50		65
Jersey City				50		65
Lynn						
Middletown				1 25		1 45
Mystic				1 25		
New Bedford		2 50		1 30		1 50
Newburyport		2 75		2 00		2 15
New Haven		2 30		1 00	1 20	1 25
New London		2 25		1 15	1 40	1 35
Newport				1 25	1 60	1 40
New York		2 15		50		65
Norwalk		2 50		1 00		1 25
Norwich		3 50		1 20	1 50	1 60
Pawtucket				1 35‡		
Portland		2 75		1 65		
Portsmouth, N. H		2 75		1 95		
Providence		2 40		1 25	1 60	1 45
Rockport						
Saco						
Sag Harbor				1 15		
Salem		2 75		1 85		
Stamford				1 00	1 20	2 05
Stonington				1 75		1 55
Taunton				1 65		
Warren				1 25		
TO RIVER PORTS						55
Albany		2 50				50
Catskill						50
Cockaskie						65
Cooyman's						20
Cold Spring						30
Fishkill						40
Haverstraw						40
Hudson		2 40				65
New York vessels						55
Nyack						60
Poughkeepsie						30
Rhinebeck						
Rondout						40
Saugerties						50
Sing Sing						55
Stuyvesant						50
Tarrytown						60
Troy		2 50				20
West Point						50
Yonkers						

* 3 c. per bridge per ton in addition to freight.
† New Haven rail and towing 25 c. extra per ton.
‡ Towing from Providence and return, extra.
And Towing.

St. Thomas	$ —	Gold
Martinique	—	"
Demerara	—	"
New Orleans	—	"
Mobile	—	"

Foreign and Provincial Freight

August, 1873.

Foreign.
Newcastle and Ports on Tyne, per keel of 21 1-3 tons £
Liverpool, 5 per cent primage

TO NEW YORK.

Provincial

Sidney	$3 5
Ingan	4 00
Cow Bay	4 00
Pt Caledonia	4 00
Little Glace Bay	4 00

TO BOSTON.

Sydney	3 50
Lingan	3 50
Cow Bay	3 50
Pt Caledonia	3 50
Little Glace Bay	3 50

TO MONTREAL.

Caledonia ... 3 75 gold

TO CUBA.

Caledonia ... 9 50 gold

MARKET REVIEW.

NEW YORK, Aug 20, 1873.

IRON—Scotch Pig is moving very slow, and business is confined almost entirely to jobbing parcels; stocks are not excessive, however, but in the general quietness of trade, consumers are loth to purchase beyond their present needs; we quote Eglinton $44@$45, Glengarnock $45@$46 Coltness (stock of which is light) $50@$51, and Gartsherie (selling in small parcels) $47.50@$48. American Pig inactive, and prices are in buyers' favor; the stock of No. 2 X is accumulating, and prices are lower, with a downward tendency; No. 1 may be quoted $44@$45, No. 2 $36@$40, as to brand, and Gray Forge $33@$35. New English Rails are inactive at $67@$68 gold, and American 77.50 currency at the works in Pennsylvania; old D. H. may be quoted $48 and T $45. Scrap is quiet, but holders on a rule are firm on the basis of late sales; 100 tons No. 1 Wrought sold, to arrive, on private terms. Refined bar from store, is nominally steady at old figures. A sale of five packs Russian No. 1 Stained Sheet, was made on private terms.

COPPER—Yellow Sheathing is steady at 38 cents, and Bolts and Brazers 40, Bronze and Yellow Metal Sheathing 27, and Yellow Metal Bolts 32, net cash. The demand for Ingot is still very limited, and we have only to notice small sales of Lake at 27@28¼, as to quality.

LEAD—Pig very quiet, and we hear of no sales. Foreign may be noted 6½@6¾ cents, and Domestic 6@6¼ gold. Manufactured is steady at old figures.

Withdrawals from bond for consumption 15th, 16th and 16th August—

Lead, Germany	pigs.160
Lead, France	707

REGULUS ANTIMONY—Continues rather steady at 13¼ cents gold, with sales of moment.

STEEL—There is no change, and no new feature to note—the supply English Cast is barely equal to the current demand.

SPELTER—Is very dull, fifty tons Silesian sold some days ago at 7¼ cents gold.

TIN—Pig remains dull; Straits is held freely at 31½ cents, with 31¼ bid; the little demand that exists is for English, preference being given to it by buyers, at the relatively low prices current; small sales are reported at 28@28¾ cents; five tons sold at a private price. Banca is entirely nominal. In plates, we hear of no business except purchases in a jobbing way; prices are without quotable change but at present are rather nominal.

Withdrawals from bond for consumption 15th, 16th and 18th August—

Tin from England	bxs.300

ZINC—Mosselman Sheet continues as last quoted, without any transactions of importance to note. Manganese oxide 4 @

MESSRS. BIGELOW & JOHNSTON, No. 43 Pine street under date of Aug 21st., review the market for the past week as follows:

AMERICAN PIG.—No. 1 remains pretty steady at from $42 to $45 for prime high brands, owing to the scarcity of this grade, Nos offered freely at from $35 to $36. Forge and White Mottled is abundant and offered at about $30 for the former named, and we think business in the latter, White Mottled, could be done at about $27 to $28 perhaps for a cash order.

SCOTCH PIG.—There has been considerable during the past week at $45 for Glengarnock, $44 for Eglinton Coltness $50 to $51 and look for higher prices for lots on the spot, owing to the small quantity for immediate delivery.

BAR IRON.—We hear of a better feeling from the mines and some are filled for the next sixty days.

OLD RAILS.—Dull and very weak, spot lots can be had at about $46 to $47 for Double Heads and T's, and forty-six might buy for shipment.

NEW RAILS.—English can be had at $64 gold, or its equivalent in currency. American $74 to $75 currency.

SCRAP IRON.—Demand light $40 to $42 from wharf, and about $45 from yard.

METALS.

NEW YORK, August 20, 1873.

IRON.—Duty: Bars, 1 to 1½ cents ₩ lb; Railroad, 70 cents ₩ 100 lbs.; Boiler and Plate, 1½ cents ₩ lb; Sheet, Band, Hoop, and Scroll, 1¾ to 1¾ cents ₩ lb; Pig, $7 ₩ ton; Polished Sheet, 3 cts. ₩ lb; Galvanized 2½; Scrap Cast, $6; Scrap Wrought, $8 per ton. All less 10 per cent. No Bar Iron to pay a less duty than 35 per cent. ad val.

	Store Prices.
Pig, Scotch—Coltness ₩ ton	50 00@51 00
Gartsherrie	47 75@48 00
Glengarnock	45 00@46 00
Eglinton	44 00@45 00
Pig, American, No. 1	44 00@45 00
Pig, American, No. 2	36 00@40 00
Pig, American, Forge	33 00@35 00
Bar Refined, English and American	— —@— —
Bar Swedes, assorted sizes (gold	— —@137 50

	Store Prices, Cash.
Bar, Swedes, 1¾ to 5 x ⅜ & ⅜ 2 sq. & 6 to 12 x ¾ & ⅜	175 00@185 00
Bar, Refined, ¾ to 2 in. rd. & sq. 1 to 6 in. x ⅜ to 1 in.	92 50@— —
Bar, Refined, 1½ to 6 by ½	97 50@— —
Bar, Refined, 2½ to 2¾ round 1 & 1¼ by ¼ & 5/16	1 00 00@— —
Large Rounds	102 50@117 50
Scroll	112 50@145 00
Ovals and half-round	120 00@140 00
Band	110 00@112 50
Horse Shoe	120 00@122 50
Rods, ¼ to 5-16 inch	97 50@140 00
Hoop	120 00@170 00
Nailrod	9¼@ 9¾
Sheet, Russia, as to assortment (gold)	17 48 18
Sheet, Singles, D. and T. Common	—5¾@— 7
Sheet, D. and T. Charcoal	—7 @— 8¾
Sheet, Galv'd, list 10 per cent, discount	— —@— —
Rails, English (gold), ₩ ton	67 00@ 68 00
Rails, American, at Works in Pennsylvania, currency	77 50@— —

COPPER.—Duty: Pig, Bar, and Ingot, 2 cents ₩ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ₩ lb	— @— 38
Copper Bolts	— @— 40
Copper Braziers, 16oz. and over	— @— 40
Copper Nails	— @— 45
Copper, Old Sheathing, &c. mixed lots	26 @— 27
Copper, Old, for chemical purposes, 14@16 oz.	— @— —
Copper, American Ingot	27 @—27¼
Copper English Pig	— @— —
Yellow Metal, New Sheathing & Bronze	— @— 27
Yellow Metal Bolts	— @— 32
Yellow Metal Nails, Sheathing and Slat'g	27 @— 30

LEAD.—Duty: Pig, $2 ₩ 100 lbs.; old Lead, 1½ cents ₩ lb

Pipe and Sheet, 2¾ cents ₩ lb.	
Spanish (gold)	6 50 @6 62½
German, do.	6 50 @6 62½
Domestic do.	6 00 @— —
Foreign, Refined	7 25 @— —
English do.	6 62½@7 00
Bar (net)	9 25 @— —
Pigs (net)	— — @10 50
Sheet	— — @10 50

STEEL.—Duty: Bars and ingots, valued at 7 cents ₩ lb or under 2½ cents; over 7 cents and not above 11, 3 cents ₩ lb; over 11 cents, 3½ cents ₩ lb, and 10 ₩ cent ad val. Store prices.

English Cast (2d and 1st quality) ₩ lb	— 18½@— 23
English Spring (2d and 1st quality)	— 9½@— 10½
English Blister (2d and 1st quality)	— 14 @— 18½
English Machinery	— 14½@— —
English German (2d and 1st quality)	— 12½@— 14½
American Blister "Black Diamond"	— —@— 11½
American, Cast, Tool do.	— —@— 17
American, Spring, do.	— —@— 11
American Machinery do.	— 11½@— 12
American German, do	— 9 @— —

TIN.—Duty: Pig, Bars, and Blocks, 15 ₩ cent. ad val.; Plate and Sheets and Terne Plates, 25 ₩ cent.; Roofing 25. ad val.

	Gold ₩ lb.
Banca	35 @—
Straits	31½@—
English	28 @28¼

PLATES,	Gold.	Currency.
	Fair to Good Brands.	
I. C. Charcoal, ₩ box	$10 87½@11 25	$12 75 @13 25
I. C. Coke	8 50 @ 9 00	10 25 @10 75
Coke Terne	7 62½ @ 8 50	9 25 @10 25
Charcoal Terne	9 62½ @10 37½	11 50 @12 75

SPELTER—Duty: In Pigs, Bars & Plates, $1.50 p. 100 lb

Plates, Foreign (gold) p. 100 lb	7 25 @— 7 50
Plates, Domestic p. lb	8½@—11

ZINC—Duty: Pig or Block, $1.50 per 100 lbs.; Sheet 2½ cents per lb

Sheet per lb.—10¼ @10¾	

San Francisco Stock Market.

BY TELEGRAPH.

NEW YORK, Aug. 20, 1873.

Our report from the San Francisco Stock Board is dated the 19th inst., excepting a slight advance in Crown Point and Eureka C. V. the market has materially declined. Following is the list.

	Aug. 20.
Savage	75
Crown Point	84
Yellow Jacket	48
Kentuck, "New Issue"	—
Ophir	87
Gould & Curry "New Issue"	65
Belcher "New Issue"	66
Imperial	4¾
Raymond & Ely	12
Meadow Valley	16¾
Eureka C. V.	12
Opair	—
Hale and Norcross	—

American Institute of Mining Engineers.

OFFICIAL BULLETIN.

Announcements to Members and Associates.

I. The ENGINEERING AND MINING JOURNAL, which is the Organ of the Institute, and contains its proceedings, transactions and notices of meetings, will be sent to each Member and Associate on the payment of his annual dues. Back numbers cannot, as a rule, be sent.

II. Dues are payable in advance at the annual (May) meeting. Remittances should be made, as far as possible, by P. O. Order, payable to the Secretary.

III. The first volume of Transactions of the Institute is in course of preparation and will be sent, as soon as issued, to all members not in arrears.

IV. General meetings are held on the fourth Tuesday of February, May and October. Authors of papers are requested to notify the Secretary, in advance of meetings, of the subject and length of their papers.

THOMAS M. DROWN, Secretary.
1123 Girard street, Philadelphia, Pa.

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April 1:6m

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ly-apr8 73

To INVENTORS AND MANUFACTURERS

The Managers of the 42d Exhibition of the American Institute, of the City of New York, beg to announce, that the Exhibition Buildings on 2d and 3d Avenues and 63d and 64th Streets, will be open for the reception of heavy Machinery August 18th and for other articles, September 1st 1873. The Exhibition will be formally opened September 10th.

For particulars, address "General Superintendent, American Institute, New York."

May 27-Sept. 10

SUPERIOR RAIL MILL.—CAPACITY: 1,000 TONS PER WEEK.

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Manufacturers of

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Our central location enables us to draw from both sides of the Allegheny Mountains Metals and Ores best adapted for making a No. 1 Rail, and together with our Improved Machinery, are a sufficient guarantee of our ability to produce Rails of a quality unsurpassed for durability and strength, by any foreign or domestic manufacture.

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THE ENGINEERING AND MINING JOURNAL.

ROSSITER W. RAYMOND, Ph. D.
JOHN A. CHURCH, E. M. Editors.

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THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.* It is the Organ of the American Institute of Mining Engineers, and is regularly received and read *by all the members and associates* of that large and powerful society, *the only one of the kind in this country.* It is therefore the best medium for advertising all kinds of machinery, tools and materials used by Engineers or their employees.

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COMMUNICATIONS *of all kinds should be addressed to the Secretary. The safest method of transmitting money is by checks or Post-office orders, made payable to the order of* WILLIAM VENTZ, *Correspondence and general communications of a character suited to the objects of* THE ENGINEERING AND MINING JOURNAL *will always be welcome.*

The Postage on THE ENGINEERING AND MINING JOURNAL *is twenty cents a year, payable quarterly in advance, at the office where received.*

THE SCIENTIFIC PUBLISHING COMPANY.

WILLIAM VENTZ, SECRETARY.
27 Park Place,
P. O. Box 4404. NEW YORK CITY.

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THE Northern Pacific Railroad is pushing its way across the Continent with steady progress. Among the latest news from Washington is the fact that the Yellowstone Reservation, through which the road will run for 250 miles, has been purchased from the Indians. This is very important, both in its possible effect upon the mining interests of the country as well as for the safety it secures to the railroad. It has long been known that very valuable mining lands lie about the Yellowstone, including mines of cinnabar or mercury ore, which may have as great an effect upon the mercury markets of the world as those in California. If the Washington telegram is true, this promising section will soon be open to settlers. Of the more than 6,000,000 acres contained in the reservation, the railroad would get nearly half. This, as well as the obvious determination of the Government to support, by every means in its power, the company which is building the Northern road, is sufficient to prove the value of the bonds and stock of the concern.

A CABLE dispatch announces that the British Iron and Steel Institute, at its meeting in Liege, resolved to hold its next annual meeting in this country, and selected Philadelphia as the place. This is the answer of the most important body of Englishmen interested in the great problems of the iron trade, to the invitation of our Institute of Mining Engineers. The fact is matter for no small congratulation. England contains more men in whom iron workers the world over are interested than all the other countries, and a year from now we shall see Philadelphia filled with men curious to see, and anxious to speak with, those whom we all acknowledge to be masters in our calling. Pity that we cannot persuade TUNNER, GRUNER, ACKERMAN, BÜTTGENBACH, FUNCK and the other studious and experienced metallurgists of the Continent to pay us a visit at the same time. Though they come here to study us, we can make their visit something more than a social meeting. The literature of the profession is almost altogether in their hands, and we shall find a more personal interest and a greater confidence in it when we have seen its authors face to face.

THERE is trouble in the Manchester iron trade. A cable dispatch of August 20 says: "The iron masters of Manchester have determined upon a lock-out of one-tenth of their men, to begin on Saturday next, and to be followed every two weeks by a lock-out of one tenth of the men then employed. It is probable that the movement thus begun at Manchester by the masters will extend throughout the country. The iron workers at Bolton urge the men at Manchester to meet the lock-out on Saturday by a strike of all hands. The aspect of affairs excites great interest in this city, as an extensive strike is apprehended. The points in dispute between the masters and men have reference to rates for piece-work and over-time. The Society of Engineers have on hand a fund of $500,000 with which they will assist the iron workers. These "iron-masters" spoken of here are evidently manufacturers of finished iron. Their action is probably taken with a view to strengthen the tendency to lower prices for pig metal, and they may succeed; but it appears to us pretty hazardous to interfere in the course of the iron trade in England after it has so long swept uncontrolled on a course that the masters were hardly able to follow and much less foresee.

The Other Side of the Coal Question.

Nothing is more amazing to the average mind than the difference between the productions of reporters on the daily press and those emanating from editors of the same great agent of civilization. The usual mode of proceeding when an important subject is to be discussed is for the editor to make an attack on general principles, the said general principles being the same as those on which an Irish row is conducted—wherever you see a head, *hit it.* Then the reporter makes his rounds among the alarmed community. To the credit of his class be it said, he usually puts down what he hears, with considerable clearness and perfect lack of prejudice. But, unfortunately, he is able to do but little in moulding the opinions of the paper. The editor is already committed, and, be the truth what it may, the course of the paper is marked out and must be followed.

This appears to be about what the New York *Tribune* has done in the matter of the coal combination. We publish in another place extracts from a report, in that paper, of the replies by several coal dealers to the inquiries of a reporter especially commissioned to ascertain the feeling in the trade toward the great companies who control the anthracite market. The reporter found out what he could have ascertained just as well from this journal—that the trade generally supports the combination and believes that a just and moderate restraint upon coal will be useful to all concerned. We have always taken the same view, and for the same reason—we found the trade almost united upon it. Early in the season certain dealers whose business was mostly confined to the Schuylkill coal, found themselves inconvenienced and some of them threatened with serious loss by the changes in that business. However hard this was to individuals, the trade generally felt that, as a whole, it had gained important advantages, and the dissatisfaction was only sectional. We have also pointed out the obvious fact that so far as manufacturers are concerned the best conditions for profit are steady prices provided they are reasonably moderate.

But the editor of the *Tribune* is not satisfied with learning the truth. Nor does he care what men, who really understand the subject, think of it. His object is apparently not to set forth an unprejudiced discussion of one of the most important industrial questions of the day, but to raise those cries of "monopoly" and "confiscation," which some editors suppose to be agreeable to the people. A considerable acquaintance with editorial life has convinced us that this system of eternally vaunting ones paper as the bulwark of freedom does not succeed. Readers are quick to discern the wheat from the chaff and the simple story of the reporter will be read with interest and believed by many a man to whom the editorial does not appeal at all.

The editorial, though a column long, contains but two points which amount to anything more than the barest chatter. They are: 1. The Reading Railroad Company ought to have its charter revoked on the ground that it is injurious to the citizens of the Commonwealth. 2. After the strike of 1871 the auction prices started at an average of $4.85 in June, and were $4.88 in July; and if, with all the dearth attending a prolonged strike, prices were then $4.86½, there is no reason why that is not enough now.

As to the first of these points, the *Tribune* and those who follow it, do not seem able to separate the Philadelphia & Reading *Railroad* from the Coal & Iron Company bearing the same name. It is true that the individuals in one are said to compose the other; but the money invested in one is entirely distinct from that in the other. No amount of prosperity of the road can be made to pay dividends on the $30,000,000 invested in the mines. The mines can no more be worked at a loss now than they could when they were the property of individual owners. Like all other business investments, they must be made to pay a fair return, whoever owns them. We have no intention of making an argument against the confiscation theory of the *Tribune.* It is not worthy the consideration of a sensible man, but those who do hold it ought to fit it on the right shoulders.

In regard to the fact that prices immediately after the strike of 1871 did not open at panic rates, we can only say that it is very creditable to the men who manage the coal trade, and bears out what we have asserted—that what is desired by the great body of producers and dealers alike is a steady business at steady prices. The extremely disordered condition of the *Tribune's* mind is seen in its comment upon the fact that the coal roads did a great business in the months immediately following the strike. It says: "The prices in these months must be very remunerative, for, if they had not been, production would not have been stimulated as it was." This is sheer nonsense. After an absolute dearth of coal for seven months, the markets call for a supply; after absolute idleness in their coal business, the roads hasten to make the year's total as large as they can, and, a year and a half later, along comes a New York paper and argues that prices must have paid handsomely then, because the mine-owners and the coal-carriers were glad to be at work once more. It is a well-known fact that the miners worked better then than ever before. They were paid by the ton, and had long arrears of bills to pay. The more they mined, the more they earned,

and the production per man was never higher. The price at that time was $4.85, which is very close upon the average of this year, and if that was not an improper price then it cannot be now.

The *Tribune* tries hard to show that the rates of 1871 were high enough to stimulate production. That the production did increase wonderfully no one will deny, but the prices were not the sole cause. The mines were in the hands of a great number of individual operators, whose financial standing had been seriously weakened by the costs of the strike and the losses due to cessation of business. A rivalry among them commenced, each striving to mine and sell the greatest amount of coal possible, and this rivalry continued through 1872, so that the production of that year was 3,500,000 tons over that of 1871. Those who criticise the combination are pointing to the fact that this year's increase is less than 400,000 tons, in proof of their assertion that the combination is crippling the market. The fact is, that the increase of last year was abnormally large, and in the very nature of things would have to be distributed over two years. We know very well that the production has been artificially restricted this year, but had prices been suffered to range as low as they would, and the output been carried as high as possible, this year's increase would still have fallen far below that of 1872. There has been nothing in the market to sustain such an increase. At no time this year has coal been scarce. Hundreds of thousands of tons have been stored by some of the companies unable to find a purchaser. One reason why there were no purchasers was at first that many dealers did not believe in the ability of the combination to carry out its intentions. But that is a feeling of three months back. It passed away long ago, and that having died out, trade revived, gently and improvingly, but never with an elasticity that betokened a waiting and needy market. This combination has undoubtedly lessened to some extent the possible sales of anthracite this year, but we do not believe the loss is a serious one, and while more attention has been paid to economy in the use of coal, we are very certain that no factory has suspended work because coal was high.

Employers in two Countries.

WE have never been able to perceive the mental processes by which Englishmen concoct their views of American life, nor to ascertain where they discover the large stores of remarkable information concerning this country which they so freely impart. Here is *Iron* announcing that "in the United States the principle of doing a large business on a small capital has thrown the reins of power entirely into the hands of the artizan class, while all the resources of transatlantic ingenuity have been ransacked with the object of replacing actual manual labor by elaborate machinery. American manufacturers cannot successfully resist a strike. So vast are the enterprises carried on with a limited capital, so high is the market value of money, and so numerous are the outlets for the handicraftsman, that the artisan is in a far more independent position than his employer." This paragraph occurs in an article which opens with the news that the builders of London have just won their own terms from their employers after a years contest. That very year was marked by a similar struggle between masters and men in the same trade in New York, *and the masters won*. The truth is that England is far more plagued with strikes than our country. We long ago gave the laborer all that he could fairly demand, and now, if he wants more he may stop work. Our contemporary says that the only consideration which holds the American workman in check is that the country needs capital as urgently as labor, and that if his demands are too high his employer will withdraw from business and live on the interest of his money. Upon consideration we are inclined to accept that as a very fair statement of the strongest check upon our workmen. The quiet which characterizes American industrial circles in comparison to those of England is satisfactory proof that the check is a sufficient one.

It is true that the system of compensation for labor which was adopted in America was based upon a rate of wages unknown before, and so high that our competitors had every advantage in their favor. High wages, high interest and constant risk from the disorder of business in consequence of working upon a capital which was too small for our necessities, combined to produce a state of things which might well appal any nation that desired to tread in our footsteps. The question was whether, under such conditions as these, we could build up an independent industry. We have done so. The changes which have taken place in the industrial world have not affected us but our rivals. The cost of labor and material has advanced so much abroad as almost to equal, and sometimes entirely to equal, our own rates. It is only in the agricultural field that wages are still kept far below our rates. In many parts of our country the farm hand and the ordinary workman are classed together as to wages. In England there is a difference between them amounting to at least 200 per cent. of the farm hand's wages. The agricultural laborers in that country are agitating for an increase of their miserable pay, and they would undoubtedly have received it long ago if England were not exclusively a purchaser and never a seller of farm produce. Whatever improvement in wages may take place among the farm workmen must come directly out of English pockets. There is no customer who can be made to bear his share. The tide of rising wages had to stop at the farm laborers, for the thought of dearer provisions frightened the landlords and people into making a determined stand against demands that were acknowledged on all sides to be just. They were just, but the country could not afford to concede them.

Our contemporary is wrong. The sources of the American manufacturers' strength are not the same as those which prop up the British employer, but current events show that they are quite as large, and yield even greater strength.

EDITORIAL CORRESPONDENCE.

The Price of Coal in England.

LONDON, July 24, 1873.

THE Select Committee on Coal has just presented to the House of Commons a report, supplementary to that of the Royal Commission, appointed in 1866 to investigate the probable quantity of coal contained in the coal-fields of the United Kingdom, and the quantity consumed and exported.

The Committee does not enter upon the question of the increased future demand and the difficulty of meeting it, which occupied the attention of the Commission, and is considered at length in their report, rendered in 1871. The present investigation has been confined to present conditions, and directed mainly to the causes of the recent advance in the price of coal, and the proper course to be pursued by the Government with regard to this subject.

The principal portions of this report appeared yesterday in the *Times*. A study of them gives the impression that the Committee is anxious to please all parties, and blame nobody. The conclusion arrived at is substantially that things must be allowed to take their own course, and that the interference of the Government, by hindering the export of coal, or in any other way, would only aggravate the evil. The most important point, to England as well as America, is the question, whether prices will ever return to where they were before the great advance. On this matter, the British manufacturer gets little comfort. The bearing of the facts seems all the other way, though the private opinions of some witnesses examined were vaguely favorable to a reduction in price. An analysis of the report will show more precisely its tendency.

As causes of the rise in price, the committee mentions, first, a considerable decrease in the production of coal per man employed. The following table, given by the committee, from the official returns, shows the amount of this reduction:

Year.	Number of men employed.	Quantity of coal raised per man. Tons.	Year.	Number of men employed.	Quantity of coal raised per man. Tons.
1864	307,542	309	1869	345,446	316
1865	315,451	313	1870	350,894	321
1866	320,663	314	1871	370,881	317
1867	333,116	316	1872	413,334	299
1868	346,820	302			

The comparison between 1872 and the former years is affected by the facts that the previous returns were not compulsory, and did not include in all cases the whole of the persons employed in the mine and about the colliery, nor do the returns admit of any account being taken of the saving of labor, either in the mine or above ground, in consequence of improved arrangements for working the collieries or delivering the coal into the waggons for transport.

This decrease in the productiveness of labor is referred to a reduction in the hours of labor, brought about by agitation of trades unions, etc. The committee says the only remedy must be an improved feeling among workingmen, to effect which the natural results of time and the ambition of laborers to better their condition are the only available agencies. It is added that the former price of coal was unreasonably low, and that the rise in wages has generally been attended with benefit to the laborers—whence it appears that the chance of a voluntary return on the part of this class to former conditions is scarcely a probable event.

The second great cause of the coal famine was the great demand for pig iron and rolled iron from America and Germany. This lead to an active competition for the varieties of coal used in those manufactures, and incidentally for all other varieties. Thus the domestic supply for householders in London has been enormously enhanced.

The committee says that the average prices at the present time, compared with preceding years, for the best house coal are as follows: 1868, 18s. 7d.; 1869, 18s. 8d.; 1870, 18s. 6d.; 1871, 19s. 3d.; 1872, 24s. 11d.; 1873, (for five months,) 32s. 6d.—the price in February last, on the London exchange, being for two days 45s. These are the prices on delivery in barges, and the consumer has to pay 6s. or 7s. more per ton.

The mitigating facts are, first, that the scarcity of coal has brought into market a great deal of small coal hitherto not utilized; that there is increased activity in mining, new collieries being opened, and abandoned ones re-opened; and that the higher prices are tending to bring about "an equilibrium of supply and demand."

All this goes to show that matters may not immediately become much worse; but it does not establish ground for hope that they will become, from the standpoint of the consumer of coal, substantially better.

JULY 25. This morning the *Times* comments editorially upon the committee's report, taking a similar view of its bearing to that set forth above. It accepts the situation frankly, and says that England must make up its mind to dear coal, and study greater economy in its use. Concerning the effect of this new condition on the manufacturing prosperity of the country, it is prudently silent, addressing itself mainly to the people who consume coal in kitchens and sitting-rooms. It is indeed among these classes that economy is most urgently needed. As Mr. LOWTHIAN BELL has ably shown, the blast furnace practice is already far advanced in the utilization of fuel; and the British marine engines, particularly the new "compound engines," (a revival of WOLFF'S two-cylinder principle,) using steam, first in a small high-pressure cylinder, then in a large low-pressure cylinder, and finally condensing in a surface-condenser, are highly economical, and perhaps as near theoratical perfection as

any now afloat. In short, the technical industries of Great Britain are, in point of economy, far ahead of her housekeepers; and the *Times* is right in calling upon these to study an art which the abundance of cheap fuel has permitted them to neglect.

But unfortunately this reform would not be adequate to the evil, as the *Times* itself virtually admits, by suggesting to those who can't afford fuel that they keep themselves warm at the forge or in the mine. Followed to its logical consequences, this argument involves an admission that the present social condition of the country must be reconstructed under the gradual pressure of an increased price of an article of necessity. In other words, the manufactures of England must cease to expand, or else a part of the town and country population must be added to the manufacturing *personelle*, and another part must emigrate.

The truth is, that England's prosperity rests upon her mineral wealth—a basis which supports an almost universal dominion, *while it lasts*, but which is unfortunately in its nature exhaustible. The Royal Commission of two years ago came to the conclusion, so far as coal is concerned, that there was enough left for many years to come; but this question of an actual exhaustion happens not to be the vital one. An economical exhaustion is quite as damaging to industry. Its symptom is a rise in the cost of the raw material; and this symptom may be said to have made its appearance with relation to ironstone as well as coal. Already some of the largest iron works in Wales and elsewhere are running on foreign ores exclusively—from Spain, Portugal and Africa.

These growing disadvantages England must offset by increased progress in labor-saving and fuel-saving inventions, and by greater skill in metallurgical practice. It will be a long time before her traditional superiority in this art and her great facilities for commercial exchanges and transportation can be overcome by any nation, however favored with natural resources. The acme of her prosperity has probably been reached; but her hale and hearty strength will hold out for yet many a year against the youthful efforts of her rising rivals.

R. W. R.

Wet and Dry Concentration.

Before me lies an extensive pamphlet—"Description of S. B. Krom's System and Machinery for Dry Crushing and Concentrating Ores;" also a letter dated June 9th, from Mr. Alexander Trippel, the well known metallurgist, concerning his visit at the latest establishment erected by Mr. Krom at Star City, Humboldt County, Nevada; also, Mr. Engelmann's paper and Judge G. W. Baker's letter.

The "Description reproduces, among many other things from the pen of the same Judge Baker, who proves himself to be a stout partisan of dry separation, a series of articles published in your Journal, 1872, in which occurs the passage: "Copernicus and Galileo got themselves into trouble by teaching theories different from those held by the learned of their times, and doubtless these learned men were most excellent men."

None will doubt the excellence of the two great men named but to compare Mr. Krom's action and, may be, suffering to theirs is entirely unjust to them. I shall give my reasons for this assertion: Mr. Krom is not the inventor of the idea of dry concentration, patented by him in 1868, as is fully proved by *Gaetzschmann's Aufbereitung*, published in 1854; but Copernicus and Galileo were the inventors of the ideas on account of which they had to suffer. Mr. Krom, in defending the idea with which he unjustly identifies himself, does not stick to truth and veracity, as the two martyrs of scientific truth did, but he misrepresents documents, thereby giving undue prominence to his system. Mr. Krom does know something about the principle of dry separation, but he proves by a variety of statements that he lacks all knowledge and experience in "wet separation."

My first point is proved by the articles in this Journal of July 22d, 1873. I, therefore, will prove now my second and third points.

Carefully examining the contents of the description of Mr. Krom's process, and developing his reasonings back from thesis to thesis, in order to come to the original hypothesis as the foundation on which all his assertions of superiority of dry concentration to wet separation are based, we arrive not at facts proved by his machinery in competition with wet-separation machinery erected with the high perfection of modern manufacture, but at a citation from Kustel (following Rittinger.)

To this citation all deductions made in favor of dry separation are directly or indirectly retraceable.

I admit my ignorance as to who is "Kustel," but who is the venerable "Rittinger" I and all belonging to my trade do know. What Humboldt was for "natural science," Rittinger was for "wet separation." He impregnated the life of science into the body of experience centuries old, and thus instigated rapid improvement, from step to step, until now, with the best apparatus, wet separation can separate all and every material one from the other, and can avoid loss almost entirely.

According to Rittinger, specific gravity is not the only principle by which wet separation accomplishes its work. There are differences in chrystalline and amorphous shapes, and the difference of adhesive power of small particles to planes of different shape and surface and description, as principles on which wet separation is based; a fact of which Mr. Krom seems unaware, because he nowhere mentions it; although, when speaking of *the dust, which he entirely neglects in separating*, there would be a good opportunity to say, that "wet separation" soaks up the *dust* as well as the *grains* and separates the mineral dust from the waste dust on revolving slime hearths, on concussion tables, and, in latter times, on continuous jigs, by filtering the water in the jigging action before it leaves the apparatus, so that unless the heavy parts be propelled quicker than the light parts by the same propelling action, they must be saved, and as the heavy material in the same upward stream cannot penetrate the light material, the heavy material must be, and is, saved.

Let us see now what citation Mr. Krom makes from Rittinger, in order to do away with all Rittinger's labors and replace them by his own:

I. *Citation as contained in Krom's Description.* The average loss at large of poor argentiferous ores in concentration by water—(thus in Krom's book) is:	Per Cent.
With coarse sand .	40
With middle fine sand	35
With slimes . .	60 to 74

II. *The original passage on page 380 of Rittinger's Lehrbuch der Aufbereitungskunde.* Im grossen Durchschnitt stellt sich bei armen silberhaltigen Pocherzen dieser Verlust nach gesammelten Erfahrungen:	Per Cent.
Bei den raschen Mehlen auf	40
Bei den mittleren (flauen) Mehlen auf .	35
Bei den Schmanten auf	60 bis 70

III. *True translation of the original text in contradiction of Mr. Krom's translation.* Poor argentiferous ores *under treatment by stamps* will lose in total average, according to experience collected:	Per Cent.
Out of the resulting quick flour .	40
Middle (slow) flour	35
Slimes	60 to 70

Now, on the same page with this citation, Mr. Krom translates in another passage, where it can do no harm to him, "Mehle" by "flour," "dust," and not by "coarse sand" or "sand."

The citation as made by Mr. Krom would intimate that in wet separation poor argentiferous ores would lose 45 per cent. in the average, and in referring to this citation, the "poor argentiferous" afterwards is left out, and thus Rittinger made to stand authority for a loss of 35 to 70 per cent. in wet separation in general. The man would turn in his recently-shut coffin could he hear such abuse of his name.

Let us see who her Mr. Krom really perpetrates this crime against veracity. The above citation is on his page 7; on the middle of page 8 he already says: "Those giving careful thought to the subject must consider the loss (as quoted from Rittinger) *heretofore involved in the modes of concentration, to be fearfully large.*"

Now Rittinger, when speaking of "loss" at all, only speaks of "ores finely sprinkled with metallic particles," but not of ores in general. He speaks of ores when treated by stamps, which treatment to avoid is what the wet separation men have been aiming at for a long time, by only stamping such particles which, forming a special product of separation, still contain some metallic parts mechanically combined. These particles form about 10 per cent. of the entire bulk after crushing, of which 10 per cent. Rittinger averages the loss at *forty per cent. of the metallic parts contained in the rock.* Thus in rock containing 1 per cent., the loss will constitute 4 parts of valuable material in 10,000 parts of total weight, and, if containing 2 per cent. of valuable material, 8 parts of valuable material in 10,000 parts of total weight.

Let us see what results Mr. Krom has to state in comparison with this result in the treatment of slime.

I quote from his "Description," with which Mr. A. Trippel's statement agrees: "The dust that may be made in the crushing and separating is conducted through pipes that lead to the screening chamber, and from the top of this enters the larger pipe of the dust exhauster—the well known Sturtevant's exhaust pan—which maintains a gentle draught of air from the working parts of the building. The intention is to remove the flowing dust, which is not susceptible (in dry separation) of concentration."

Again: "Some loss (in dry concentration) will arise, first, from the adhering of small particles of mineral to the gangue rock, and secondly, from the fact that crushing in any method will reduce some portion (less or more) of the mineral itself to the condition of floating dust."

"In cases where the dust can be made valuable (without concentration, as there is none in the dry process) by amalgamation, as in many gold and silver ores, the percentage of loss is reduced correspondingly."

What does all this mean? The dust which Rittinger describes to sustain a loss of 40 per cent. is, all and totally, considered as loss by Mr. Krom in his process, and all metallic parts adhering to gangue matter is loss, because there is no washing and no sufficient sizing.

I have seen at different times and places the whole gangue matter after leaving crusher and rollers to be covered with galena-dust to such an extent as to make it all appear colored with lead particles. In the wet separation all these particles are washed off and separated, and saved in the continuous jigs, but in dry separation they are a total loss.

Dr. Trippel writes to me:

"I wish to inform you that I have seen the establishment in Star City, Humboldt County, Nevada, constructed by Mr. Krom. He was at the place himself and directed the work. The results were very satisfactory for an establishment based upon a comparatively new principle. The ores being antimonious, argentiferous ores, with lead, zinc, etc., and disseminated finely and as unfavorable for smelting as for amalgamating, occasioning failures in both. By the dressing of the mineral it was condensed from $50 per ton to $1 200 per ton, with tailings of $11, and the flour (dust) not counted, which admitted no other treatment in the dry concentration process, but was left for eventual smelting or amalgamation without further concentration."

Thus Mr. Krom's best and latest results as well as his own statement show

that "flour" and "dust" are untreatable with the dry concentration process, and that the tailings contain $11 per ton out of $50, or above one part out of four, or more than 25 per cent. of *all* value contained in the rock. Or are my figures incorrect?

Every ton tailing contains $11, leaving $39 to the concentrated ore. To make up from these the ton of $1,200 there are required 31 tons on which there is at least 2 tons of dust as rich as the original ore. This constitutes a loss of $441 on $1,641 in the rock. Can this result be compared to wet separation? Granular ores there carry no adhering metallic parts away with them, the dust is there concentrated and separated just as well as the grains and sands. Had RITTINGER to write his book to-day after the introduction of the "continuous jigs," he would not, as he really does, in the supplement of 1870, calculate the general loss as 9 percent. of the metallic particles contained in the ore, but he would describe the actual loss, as it really is in a good modern mineral dressing establishment for wet separation, as forming one part in twenty of the valuable material, or in ore with 1 per cent. metallic constituents, as forming one part in 2,000 total weight; a loss which even may be reduced in introducing such contrivances as the science of wet concentration indicates, but which contrivances are generally neglected on account of the owners of mines not being desirous to complicate heir arrangements further than to make them intelligible to common class workmen.

As to the natural qualities of water and atmospheric air for the purpose of the separating action, an unprejudiced investigation shows very important points in favor of water.

1. Water not possessing any elasticity, all motion can be calculated on as corresponding with spaces allowed. Air possesses elasticity, its motion resembles a series of explosions rather than steady progressive motion.

2. Water possesses cohesiveness, so that particles which are once arranged according to their specific gravity are kept in that arrangement and do not return to their former condition of heterogeneous mixture, thus improving with the continuation of the separating action, but not again disturbing by explosive motion and lack of cohesiveness, the required arrangements of parts.

3. Water has dissolving qualities on parts adhering together, on clayey matter, which dissolving quality air entirely lacks.

4. Water, in flowing over an inclined plane, exercises so gentle an impulse of motion on small particles of rock and metal that the difference in the natural shape of such particles will result in sufficient difference of adhesive action to allow separation, (copper pyrite and blende can be separated on a revolving slime hearth with india rubber cloak.)

Air cannot, with any known contrivance, achieve separation where no difference in specific gravity can be worked upon.

If Mr. KROM claims all the merit of introducing a contrivance for separation fit for those places where no water can be procured, he is entitled to it, and the action is so meritorious that he could be satisfied with it without infringing on the merits of wet separation. We all should try to enlighten the public concerning the importance of good effectual separation, each kind at its proper place, but not in unneeded competition arouse suspicions and wrong notions, of which also Mr. ENGELMANN made himself culpable.

Rose Clare, Ill., July the 24th, 1873.

F. CAZIN, M.E.

American Triumphat Vienna.

The distribution of awards has taken place at Vienna, but, strange to say, no official list of them has been telegraphed to this country. The New York *Herald*, however, has published a list which we have classified according to the groups in which articles are distributed at Vienna, and give below. Among the names will be noticed many which are familiar to mining men and engineers. The number of prizes received by exhibitors from this country will be surprising to most people, after the acknowledged failure of our representation. It is said that in the machinery department about one exhibitor in three was distinguished as worthy of special honor. It was noticed too that the machinery displayed by other nations bore evident marks of an American origin, and yet we have observed that, with all the copying of our models that has undoubtedly taken place since the Paris Exposition of 1867, the American wood-working and other machinery is spoken of as bearing marks of distinctive originality, and is different from that of foreign makes. The English makers, on the other hand, showed a remarkable ability to adapt their constructions to the necessities of other climates.

The highest prizes given are the grand diplomas of honor of which nine will be brought home by American exhibitors, as follows:—1. To United States Government for display of cotton and products. 2. To National Bureau of Education. 3. To the State of Massachusetts. 4. To the City of Boston. 5. To the Smithsonian Institute, Washington.

These four for excellence in methods and progress of education and schools.

6. To Walter Abbott Wood, of Hoosic Falls, N.Y., for agricultural machinery. 7. To William Sellers & Co., Philadelphia, for progress in iron manufactures. 8. To Samuel S. White, for dentistry. 9. To George H. Corliss, of New York, for machinery.

There are five sorts of medals, all in bronze, and awarded for excellence in the following:

For the fine arts the prize is in the form of a medal for fine art.

Exhibitors in former universal exhibitons receive for the progress they have made since the last exhibition a medal for progress.

Exhibitors for the first time taking part in a universal exhibition receive, as a reward for the merit they have shown in a national economical or technical point of view, the medal for merit.

Exhibitors whose productions fulfil all the conditions of refined taste, in color or in form, receive the medal for taste.

Finally, the assistants and workmen, who, according to the statements made by the exhibitors, have taken a notable part in the production of a rewarded object, receive the medal for co-operation.

The names of those who have received medals, according to the *Herald*, are as follows:

Group 1. *Mining, Quarrying and Metallurgy*—G. P. Kustel, California, for minerals. The State of Alabama, for minerals. R. P. Rothwell, New York. The States of Indiana and Tennessee, for minerals. The Sutro Tunnel Company, Nevada, for mine models. Witherby, Sherman & Co., Port Henry, N.Y., for their magnetic iron ore. The Joseph Dixon Crucible Company.

Group 2. *Agriculture, Horticulture and Forestling*—T. Bradliss, Louisiana, for sugar. Deere & Co., Moline, Ill., for agriculture. L. N. Moody, New Orleans, for sugars. Kimball and Co, of Rochester, N.Y., for tobacco. Joseph Newman, California, for cocoons. Adolph E. Bader, of New Orleans, for sugar cane.

Group 3. *Chemical Industry*—C. C. Colgate, for soaps. The Eclipse Oil Company for petroleum. H. G. Hotchkins, Lafont, New York, for ether. Proctor & Gamble, Cincinnati, for soaps. Emil Scheffer, Louisville, for pepsin. Henry Bowen, Philadelphia, for drugs. Burkhardt & Co., Cincinnati, for oils. McKessen & Robins, New York City, for oils. Behan, Thorne & Co., of New Orleans, for alcohol. Edmond Bourgois, of St. James parish, La., drugs. Alexander Fries Brothers, New York, for essences. Gest & Atkinson, Cincinnati, for oils. Pain Brothers, New York, for ether. F. S. Pense, Buffalo, for oils.

Group 4. *Substances of Food as Products of Industry*—Stein, Hirsch & Co., Chicago, for starch. Charles Morgenstern, New York, for starch. Theodore Bergner, Philadelphia, for brewing instruments. G. Fox, Cincinnati, for starch.

Group 5. *Textile Industry and Clothing*—Goldsmith, Bachrach & Co., New York for gloves. Elias Howe Sewing Machine Company, for sewing and stitching. Michaels & Kaskel, wearing apparel. Alfred Dodge, for felting. Moritz & Mühler, of New York, for furs. Thomas & Co., of New York, for cloths. H. P. Cooper, for clothing. W. & T. Sloane, for carpets.

Group 6. *Leather and India Rubber Industry*—Buckley, Lockwood & Co., of New York, for leather. Better & Co., of Baltimore, for leather. Conrad, Fabel & Morrey, of Louisville, for leather. The Wisconsin Leather Company, of Milwaukee. C. L. Hathaway & Sons, Boston, for leather. F. Whittaker and E. C. Burt, of New York.

Group 7. *Metal Industry*—Richards, London & Kelly, of Philadelphia, for saws. William Kesser & Co., Cincinnati, for stoves. Sargent, Greenleaf & Co., for stoves. The Barston Stove Company, of Providence. John Grossings, of Cincinnati, for stoves. E. H. Barney, of Springfield, for skates. Peters Bros. for hardware. Pape Brothers, of Cincinnati, for mouldings. James Morton, of New York, for gold pens. Ephraim Johnson, of New York, for gold pens.

Group 8. *Wood Industry*—No awards to Americans.

Group 9. *Stone, Earthenware and Glass Industry*—No awards to Americans.

Group 10. *Small Ware and Fancy Goods*—James M. C. Martin, of New York, for brushes.

Group 11. *Paper Industry and Stationery*—Sanford & Co., of Cleveland, for account books.

Group 12. *Graphic Arts and Industrial Drawings*—Duval & Hunter, of Philadelphia, for chromos. The Bureau of Engraving and Printing of the Treasury Department at Washington. W. R. Howell, of New York, for photos. James Landy, of Cincinnati, for photos. Henry Mossler, of Cincinnati, for printers' colors. C. G Watkins, San Francisco, for photographs. Henry Rickman, of Cincinnati, for photographs. Charles Bierstadt, for Niagara Falls stereoscopes. Scovell Manufacturing Company, for photographic apparatus. Miss Sarah Fowler; Charles Maurice, of New York, for printing. Jules Marcot, Boston, for maps. Northern Pacific Railway for maps.

Group 13. *Machinery and Means of Transport*—Jones & Laughlin, of Pittsburgh, Pa., for shafting. The Rogers Wheel Company, of Cincinnati, for wheels. The Ramapo Wheel Foundry, of New York, for car wheels. Charles Churchill, of New York, for wheels. P. D. Kennedy, for pumps, Cowing & Co., of Seneca Falls, pumps. Pratt & Co., for mowing machines. Aultman, Miller & Co., Akron, Ohio, for mowing machines. Bullock & Co. Cincinnati. McCormack, Chicago, for reapers. T. B. West, for agricultural implements. Mellick & Co., Albany, for agricultural implements. The Stiles and Parker Press Company, of Middletown, Conn., for presses. H. E. Townsend, of Boston, for machine. The Bienville Iron Works, Louisiana, for cotton oil machinery. The Weed Sewing Machine Company. Wilson Sewing Machine Company, of Cleveland. Wilcox & Gibbs Sewing Machine Company, of New York. The Lamb Knitting Machine Company of Chicopee Falls, Mass. C. Weeks & Co., of New York, for carriages. Charles Churchill, of New York, for iron drills. W. W. Batcheler, for electric machinery.

Group 14. *Philosophical and Surgical Instruments*—Charles Abbey & Sons, of Philadelphia, for dentistry. Darling, Brown & Sharp, Providence, for surveying apparatus.

Group 15. *Musical Instruments*—No awards to Americans.

Group 16. *The Art of War*—The Government Armory at Springfield, Mass. The Colt Manufacturing Company, for firearms. The Metallic Cartridge Company, Bridgeport, for War Department equipment arms. Remington & Sons,

Illion, New York, for firearms. The Providence Tool Company, for arms. The Schoeppe Rifle Company, Hartford. W. B. Wait. Smith & Wesson, of Springfield, for revolvers.

Group 17. *The Navy*—No awards to Americans.

Group 18. *Civil Engineering, Public Works and Architecture*—General John Newton, for blasting at Hell Gate. Anderson G. Meyers, New York, for pneumatics. The American Institute of Architecture, for plans of buildings.

In Groups 19—*The Private Dwelling House*; 20, *the Farm House*; 21, *National Domestic Industry*; 22, *Exhibition showing the Organization and Influence of Museums of Fine Arts Applied to Industry*; 23, *Art Applied to Religion*; 24, *Amateur Exhibition of Fine Arts*, and 25, *Fine Arts of the Present Time*, there were no awards to Americans.

Group 26. *Education and Instruction Teaching*—Harper Brothers for educational books. Astor Library of New York, for the promotion of science. Brewer Gardner, books. Cooper Institute of New York, for the improvement of the working classes. Cowperthwait & Co., of Philadelphia. Henry Barnauld, of Hartford, for educational journalism. Henry C. Lea, of Philadelphia, for science. Ernest Steiger, of New York. Luther Whiting, of Preston, for music. The National School Furniture Company. The Printing House for the Blind, of Louisville. Joseph L. Rooh, of Boston, for school furniture. The Geographical Society of New York. Joseph Sheller, of Jersey City, for globes.

The following we have no means of classifying:—The cities of Cincinnati, Chicago and New York. Schoch Brothers. Angelo Locola, of New Orleans. Isodo Busch. John Gelhei, of St. Louis. The James S. Smith Manufacturing Company, of Providence, R.I. G. H. & G. M. Walker, of Worcesterr Mass. Witherby, Rugg, & Richardson, of Worcester, Mass. C. B. Rogers & Co., of Norwich, Conn. T. McDermott & Co., of Cleveland. Wilson, Henkel & Co., Cincinnati. Le Clerq Brothers, of Gallipolis, Ohio.

Leveling Coal Upward.

From the New York *Tribune*:

The retail rates of coal, at this time last year, in this city, ranged from $5.50 to $6 per ton; it is now selling at $7.50, with red ash coal at $8.50. The price has been steadily advancing since May from 10 to 15 cents per month, although the demand has not increased and stocks laid in by householders are smaller than during the same months for several years past. The wholesale price of Scranton coal, as indicated by the auction sales, is $1.41 higher than it was last summer. A *Tribune* reporter visited, yesterday, a number of wholesale and retail coal dealers and the officers of the large mining and transportation companies in order to learn the reason for this large increase in price. The opinions of the dealers not interested in the business of mining may be stated thus:

Coal is higher this year than it was last year, because it was then too low to pay fair profits to the mining companies. Within the past year the Philadelphia and Reading Railroad Company have come into possession of the Schuylkill mines which were formerly owned by a large number of small companies, and have engaged not to bring any more coal to market at lower rates than will pay dividends on the capital invested in the business. Each month they issue a circular stating the price at which they hold their different grades of coal, and none can be bought except at their figures. Each month since May from 10 to 15 cents have been added to their schedule rates. The Reading Company have an understanding with the Scranton Coal Company by which the latter's prices are made to correspond to theirs. This company now bring only 75,000 tons of coal per month to market, while last year they brought from 120,000 to 130,000 per month. Their monthly auction sales are held a few days after the Reading circulars are issued, and are merely for the purpose of getting prices on a level with those of the Reading Company. They are practically mock auctions. The two companies, with the Pennsylvania Coal Company and the Delewaro and Hudson Canal Company, control nearly all the coal lands. The two last named companies pretend not to be in the combination, but they avail themselves of the high prices, and help to keep them up. The effect of this combination is to force prices up beyond the point they would reach under the regular operation of the law of supply and demand. There has been little demand during the past season, and business has been unusually dull. People are not laying in so much coal as formerly, and seem to hope that prices will fall before winter. It is not probable that this will be the case, unless the Pennsylvania Coal Company puts prices down, as they have done for two or three winters past. When navigation closes and their contracts are all filled they may sell at lower prices; but there is no certainty in the matter. he companies limit the amount of coal mined, so as to prevent a glut of the market and keep up their prices, which they admit are now remunerative. If this be the case, they should not put up the prices next month; and whatever they add to present rates will be so much taken directly from the pockets of the people. The trade during the coming Fall will necessarily be very brisk, as the usual supply of coal must be laid in, and the business which generally extends over the entire season, will have to be done in two or three months.

OPPORTUNITIES FOR GREAT ABUSES

The dealers with whom the reporter conversed believed that the combination was wholesome in its effects upon the coal trade, but was liable to great abuse. The competition formerly indulged in by the many small companies engaged in mining, had caused fluctuations in prices which were injurious alike to miners, dealers, and consumers. The war caused an increased demand and higher prices; these led to the opening of many new mines, and the forcing of large quantities of coal into market, and a consequent depreciation of values The fall of the price would cause a suspension of mining business, a scarcity of coal, and a rise in rates The low prices of last year caused the ruin of many of the Schuylkill companies, and the Philadelphia & Reading Railroad Company, which already owned a large amount of mining land, stepped in and bought up all they could obtain The earnings of the railroad in the past, as shown by the dividends, are no indication of the profits derived by the Company from coal lands, as the carrying business of the Company has been very profitable for a number of years.

THE PENNSYLVANIA COAL COMPANY'S VERSION.

The reporter next visited the offices of the four large companies which virtually control the coal trade. The Pennsylvania Coal Company owns the mines in the Pittston region. Mr. Mead, Secretary of the Company, said that their business was not a fair criterion by which to judge of others. They bought much of their mining lands at $50 an acre, which are now worth $2,000 or $3,000 per acre, and built their road when labor was worth only 80c or $1 a day, while now it is worth three times as much. They declare large dividends, of course, as they expect to earn a fair percentage on the present value of their property, without reference to its cost price. His company was not connected with any combination, but it was not for their interest to put prices down. Their plan of operation was to receive bids for coal from their customers, and on the 25th of each month, to send out a circular naming the price at which it would be delivered during the following month. If a customer declined to take it at the price named, the amount awarded to him was divided among other bidders, the amount called for being always in excess of that mined by the company. The present prices were not above the average of seven years past, and were not higher than was necessary in order to remunerate the companies. The losses last year amounted to several millions of dollars, and he could not understand why the companies had continued to mine coal and bring it to market at the rates which prevailed. He said there was a popular mistake also in relation to the payment of dividends; the dividends paid one year represented the earnings of the previous year, but well-regulated companies tried to average their dividends, and in a good year kept back a part of their earnings for a bad year. He said that the action of the Reading Company had, in his opinion, been beneficial not only to the trade but to the general public. The small companies formerly mining coal in the Schuylkill region, sent their coal to market in bad condition, and the quality of that sent by the different companies varied greatly; some was nearly worthless, and the value of all suffered from the lack of any standard as to quality. The Reading Company put coal of the same kind together, and gave it a fixed average as to quality as well as price. The action of that company in effecting uniformity of prices was, in his opinion, beneficial to the public, whose interests always suffered from fluctuations in any staple The continuance of last year's low prices for one year longer would have caused a general suspension of mining operations and sent coal up to double its present price The gradual increase of price through the season by the addition of 10 or 15 cents per month was right and reasonable it was in the nature of a penalty paid by the consumer for compelling the producer to carry the coal during the season. The mining and transportation operations are divided quite equally among the months intervening between the opening and close of inland navigation. If the sales are postponed until late in the season the company must carry the coal through the early months of the season and lose interest on property, and also suffer loss from breakage in the second handling The extra price is an inducement to the consumer to co-operate with the miner in advancing their common interests Mr. MEAD said that there would probably be a steady advance in rates until November, after which they would remain stationary until the opening of navigation in the Spring, when they would fall to about the same level as last Spring.

PURCHASING POWER OF COAL.

R. G. MOULTON, general agent of the Delaware and Hudson Canal Company, took precisely the same view of the matter. He said that coal, as it now stood, did not show so great an advance in price as labor and all the other products of labor. When it was at its lowest, a ton of coal would bring more than a barrel of flour; it would not now buy a barrel. The large advance of the past year simply showed that prices were too low a year ago, and had now reached a healthy level. There were many millions of dollars lost last year by the mining companies—he placed it as high as $18,000,000—and if the low rates had continued, the result would have been a general stoppage of the business and a tremendous inflation of prices. He thought the efforts of the Reading Company had been directed to placing the business of coal mining on a safe and substantial basis, such as was necessary for the proper protection of the vast amounts of money invested in it. The companies which paid large dividends were those whose property had increased greatly in value after their purchase; the prices paid for coal now would not pay large profits on mining property purchased now, or on its present valuation. It was a mistake, he said, to suppose that all the companies paid dividends last year; his own company passed one dividend and he named several which paid none during the year. It was as unjust to call them to an account for deriving a fair profit from the use of their property as it would be in the case of any other class of dealers or producers. It was all well enough to say that coal ought to be placed in the hands of the poor at low prices; but if the prices became unremunerative, they would stop work, and the poor would have to go without or pay exorbitantly. Why not say to the farmer or the butcher that the poor must have cheap bread and beef? So they should; but if the farmer and butcher were unable to derive a profit from their labor, there would soon be no bread or beef for the poor.

Mr. HOLDEN of the Scranton Coal Company, and Mr. QUINTARD of the Philadelphia and Reading Railroad Company were not in town, and in their absence the other officers declined to make any statements in regard to their companies or the coal trade.

MINING SUMMARY.

The Production of Borax.

From the San Francisco Commercial Herald and Market Review.

The *Evening Bulletin* of June 9th, 1873, under the head of "Mining Summary," gave a short account of the borax deposits in Nevada, with the following statement of the production from them, which, under the title "Borax," also appeared in the New York *Price Current* of June 28th, 1873: "From Columbus Marsh, 220 tons; from Fish Lake Valley, 120 tons; from Rhoads's Marsh, 300 tons; from Teal's Marsh, 240 tons." Thus giving currency to a report, which has gone abroad, that Nevada alone is sending to market 880 tons of borax monthly, "to say nothing of the prospective increase." The gathering of this amount of crude material, and the conversion of it into properly refined "standard" borax, would require about $200,000 in cash per month, and $1,000,000 would have to be invested all the time, to keep the business moving. These estimates do not include the value of lands, works and other improvements, and the necessary refineries, which last must be at places where abundance of pure water, cheap fuel, and cheap labor can be had. These, which constitute the permanent investment, or "plant," would call for another million dollars, at least. Does any one believe the twentieth part of this money has been invested in this branch of industry? All who are familiar with this matter know the above statement of 880 tons monthly production is greatly exaggerated, and that it is probably largely more than the entire amount of crude, concentrated and refined borax which has thus far been shipped away from Nevada. Still it has been more than enough to completely derange and break down the borax market, in this country especially.

As the above statement is likely to mislead the public, and perhaps involve many persons in serious losses, it becomes necessary to warn them of the risks they will incur by going blindly into this business. Prior to the discoveries made on this coast, the borax of commerce was supplied to the world chiefly by Messrs. Woods & Co., of England, who had practically a monopoly of the trade, and obtained their supplies from the Tuscan Marshes in Italy, held by them under contract. The only other source of supply was in the extensive "tincal" (borate of lime) fields of India. The United States were supplied by Messrs. Pfizer & Co., of New York City, and Messrs. Powers & Weightman, of Philadelphia, both agents of Messrs. Woods & Co. As there is a duty of ten cents per pound on manufactured borax, and until lately, five cents per pound on "tincal," which is now free, the two firms obtained boracic acid, duty free, from Woods & Co., and combined it with soda, which is lightly taxed, and thus escaping the heavy tax on borax, supplied the American market. Their only com-

petitors were Messrs. John Taylor & Co. of this city, wo produce at Borax Lake from seven to nine tons monthly.

When the deposits of borate of soda were discovered on this coast, borax was selling in New York at $700 currency, and was worth here, in quantity, $500 gold per ton. The discoverers thought they had found a source of wealth better than the once-famous "diamond fields." Every man who could procure a kettle for boiling, and a tub, a barrel, or a dry-goods box for crystallizing borax, went into the business. Those who from poverty or other causes had no facilities, gathered the best natural crystals in boxes and shipped them as "Nevada refined," and even shovelled the "crude," dirt and all, into sacks and sent that to New York, at the expense of any one credulous enough to make advances or accept consignment of it. In this way some 400 tons or more of so-called borax accumulated in New York, where it could not be sold, not being commercial borax, and could not be refined—there being no works whatever in the East adapted to this purpose. Under the pressure to sell, in order to get back advances and charges, the price of refined borax rapidly fell from 35 cents per pound to 18 cents and even 15 cents currency, with no demand for, or sales of, the mass of inferior and crude stuff.

The reported discoveries of other large deposits in Oregon and in California also helped to keep down the market. Although many of these have proved to be borate of lime, or of very low quality, and most of them too remote for successful working, there has been but a slight recovery in prices at New York, and the market is liable to break again at any moment. In the first excitement, and dazzled by the hope of sudden wealth, none stopped to ask, What is the demand for, and how great the consumption of, this article? But now the facts crop out that the principal use of borax is in potteries; that in Staffordshire, England, where are some of the largest establishments in the world, the annual consumption is about 1,000 tons. In all England and Europe, it may be 10,000 tons yearly, and may very likely prove much less. In the United States it may reach 1,000 tons yearly, and on this coast probably 25 to 30 tons would supply the demand. A well-known chemist, at the head of a large establishment in this city, after long and diligent inquiry, puts the consumption of the United States at not to exceed 600 tons per annum.

With these data to go upon, what must be the result for those who have embarked in the borax trade, if the figures given in the *Bulletin* and the *New York Price Current* are even proximately correct? There are other dangers for the borax producers to encounter. It has been shown that instead of 800 tons monthly, Nevada has not supplied 200 tons even, and yet she has "broken the market." Now, according to letters received here by some of our prominent merchants, Messrs. Wood & Co., who have heretofore supplied the world, declare their ability not only to largely increase their production but also to reduce their price fifty per cent.—to four pence per pound—which, they say, would still leave them a profit; and that they shall do so if the reported discoveries on this coast prove to be true. Should they do this, it would at one blow destroy this new industry, from which thoughtless and over-sanguine people have expected so much. Even at higher prices than those now ruling, few of the borax producers have been able to save themselves, and most of them seem to have already failed or else voluntarily retired from the trade. Therefore, great prudence is necessary on the part of those who may persist in this business; and extreme caution should be exercised by all who are solicited to furnish capital or make advances to producers.

The uses of borax in large quantities are comparatively few, and if the production largely or at all exceeds the demand, of which there seems to be great danger, the surplus cannot be sold at any price. The case is precisely this—a few ounces of diamonds are now worth an enormous sum of money; but if any one had a ship-load of them, what could he sell them at?

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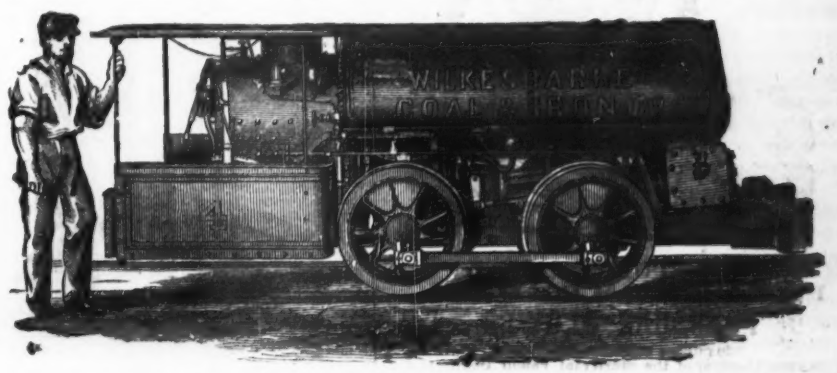

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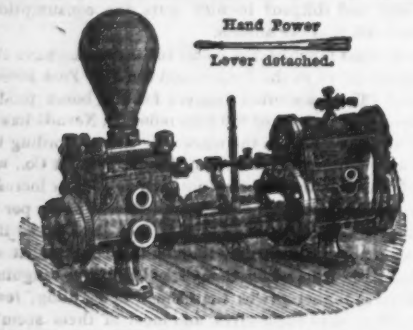

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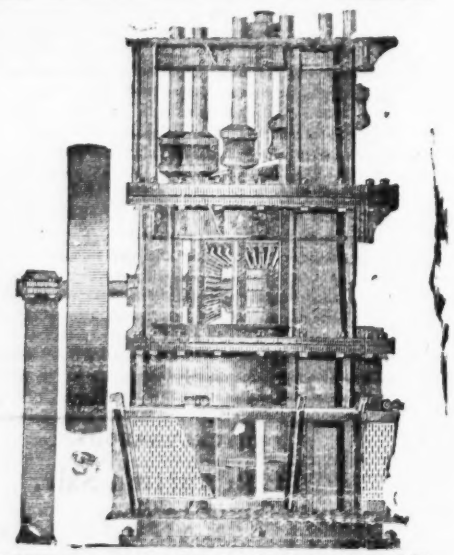

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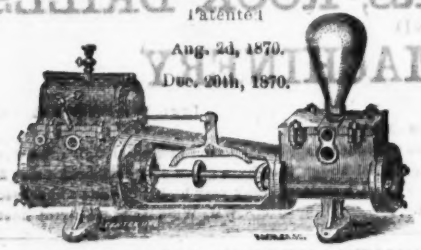

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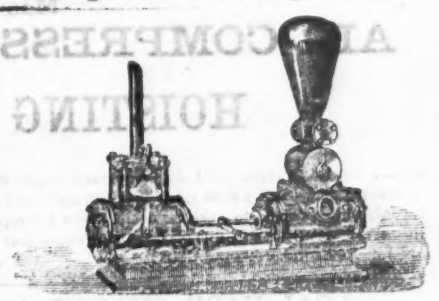

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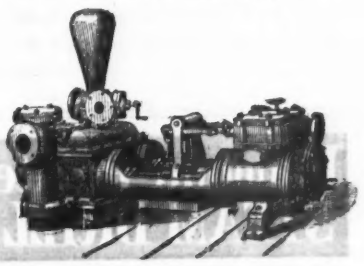

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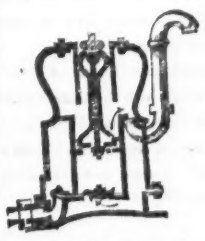

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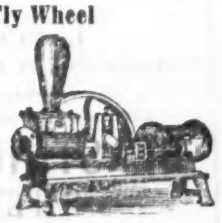

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Nov. 19 1y

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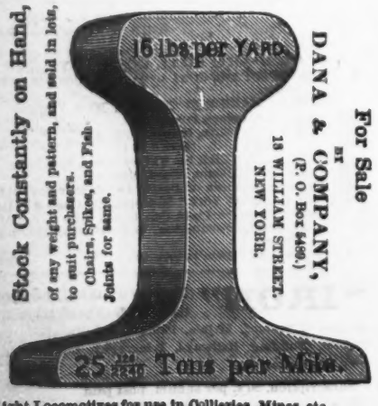

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